THE

ELECTRICAL REVIEW

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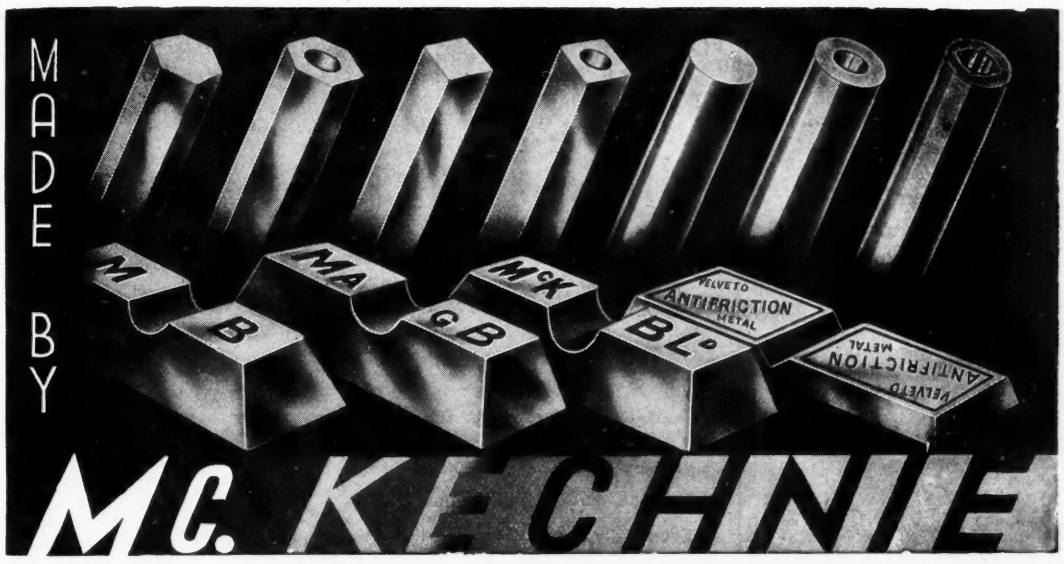

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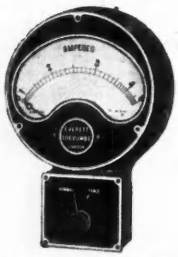

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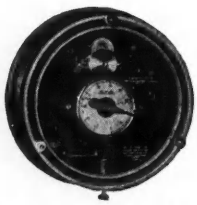

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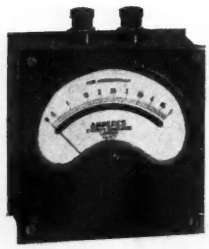

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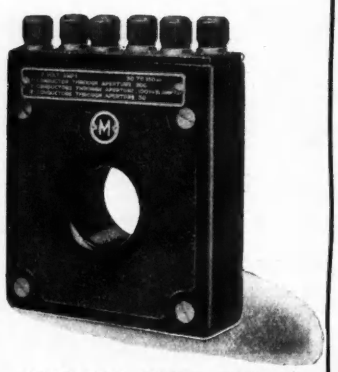

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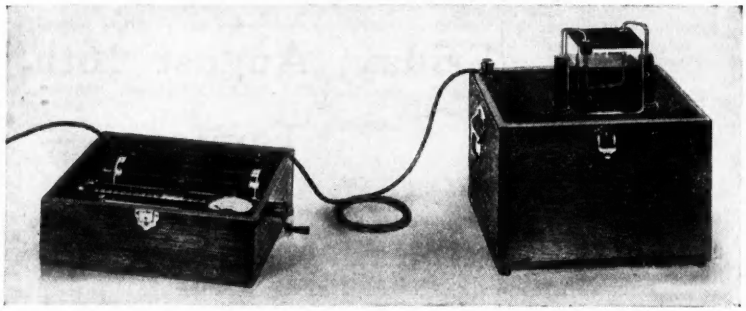

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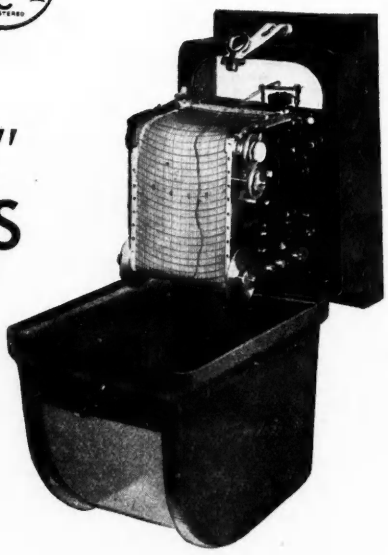

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High Power Factor

A Wartime Necessity

IN an article in this issue we have tried to show how war conditions have directed greater attention to power-factor correction, but we have been surprised to find what little regard has been paid to the subject in some quarters. While in the majority of places in this country it is obvious that power-factor correction has received greater attention as the result of the war, many supply undertakings have reported that in their particular areas no such effect has been noticeable.

Investigation has shown that in some cases there are two opposing reasons for this. On the one hand the explanation is that the supply undertakings had done so much spade-work in the matter during the few years preceding the war that the consumers already appreciate the advantages and, apart from some bargaining over tariffs and tariff conditions, they are quite ready to install correction equipment as a normal thing—war or no war. On the other hand, in areas in which the supply undertakings have never offered any inducements or done any educational work in the matter there are consumers who immediately look for the " snag." One common example of such apathy is the lack of concern shown by the supply authority as to where correction should be applied in the factory. Is this attitude in line with the idea of service to the consumer?

High P.F.—Less Waste

Apathy has also led to some very erroneous ideas as to the extent of the possibilities of the application of correction. It is held in some cases that it is only where long transmission lines are encountered that consumers are encouraged to interest themselves in the matter. While we agree that an undertaking with such lines is confronted with problems of economy more acute than those generally met in denser areas supplied from networks, we have only to point to a few undertakings such as Manchester to disprove the assertion. Again, it is contended in some quarters that only in the case of very large consumers is correction worth while, but we could quote dozens of instances where correction has paid handsomely on yearly consumption charges of well under £1,000.

There can be no doubt about the importance of maintaining high power factor at the present time, particularly in view of the appeals made to avoid waste. We agree, however, that in some cases war-production exigencies demand that correction must be sacrificed in the interests of speed of manufacture and delivery, but generally the saving in materials which can be effected by correction is all-important.

Apathy is also sometimes reflected in tariffs which are quite inadaptable to power-factor correction considerations, and we know of some tariffs so low by reason of bad design in the first place that it is now impossible for the undertakings in question to do anything to encourage correction. In some cases accounts of £500 or more per year do not carry any power-factor adjustment clauses, while in others accounts as low as £40 per year can pay for condensers in two or three years.

Prevention Better . . .

We hope that after the war there will be some straightening out in this connection, and we suggest that it is not too early now for a little spadework to that end. We believe that some of the soundest tariffs in this country have both penalty and bonus clauses for power factors below and above a datum line, but we feel that there is something in the idea that penalisation, as against encouragement, has an adverse psychological effect on some consumers.

We cannot urge too forcibly the principle that " prevention is better than cure " in connection with power factor correction. Where it is possible, obviously the best thing to do is to put in motors which do not need correction; and that does not always mean special motors. It should be remembered that a well-designed high-speed induction motor at full load has quite a reasonable power factor, so that much can be done in planning an installation by the proper selection and application of motors, particularly with regard to sizes and speeds. Synchronous-speed driving is often demanded; what is actually required is merely power-factor correction, without regard to precise speed.

The rapid development of the individual drive in recent years has been a definite advance in electrical progress—we must first emphasise that; but to regard individual driving as the panacea for all evils is a grave mistake. The ELECTRICAL REVIEW has often had to point out instances where the group drive has been proved the better method, and now we must stress the fact that nearly always (but not

quite) does individual driving mean a worsened power factor. To convert a 60-HP group drive might easily necessitate an aggregate of 180 HP of individual driving motors. By no means do we suggest that the lower power factor necessarily means that in all but a few instances group driving should be retained, but we do strongly advocate thorough investigation of every individual installation rather than attempting to apply a general formula.

Export Quotations

AFTER long delay the Government has decided to remove a serious handicap to our export trade—the difficulty of quoting firm prices in the face of rising costs. As long ago as December 2nd, Mr. Oliver Stanley, then President of the Board of Trade, said that the Government was "considering the possibility in appropriate cases of having some scheme which would make it possible for firms to make firm tenders and to obviate the loss of orders." On Tuesday, in a written reply to a question, Sir Andrew Duncan, the present President, stated that the Export Credits Guarantee Department had introduced a new facility in the form of a policy whereby an exporter might insure for a period of as much as six months against any rise in marine insurance, Government war risk insurance, and freight rates affecting a particular contract. Sir Andrew also announced the introduction of an all-in policy covering risks now insured under separate or interlinked policies. All electrical exporters will welcome this very substantial assistance.

Dispensation with Consent

THE Minister of Transport has made the Central Electricity Board (Main Transmission Lines) Order, 1940, which relaxes the conditions attached to the erection of overhead lines for grid purposes. Any main transmission lines which the Minister certifies to be necessary or expedient in the interests of public safety, the defence of the realm or the efficient prosecution of the war, or for maintaining supplies and services essential to the life of the community, may be erected by the Board without the necessity for obtaining the express consent of the Minister or of any local authority. It is provided, however, that the Board shall give seven days' notice of its intention to the local authority (including the County Council) concerned and the proviso to Sub-section (1) of Section 22 of the Electricity (Supply) Act, 1919, is altered in such cases to provide that only seven days (instead of twenty-one) are allowed to owners or occupiers of land in which to give consent or make stipulations. Special regard is to be paid to cases in which ancient monuments are likely to be prejudicially affected.

Rectifiers in Air Raids

IN spite of its uses nowadays for so many purposes in which ability to resist impact is essential, the idea persists that glass is necessarily fragile. On that account doubts have been expressed as to whether glass bulb mercury-arc rectifiers are unduly vulnerable to attacks from the air. The answer is surely that, as the bulbs are made of tough heat-resisting material spherical in shape, they are highly resistant to concussion. Further, they are normally operated under an external pressure of some 15 lb. per sq. in., the condensing chambers being designed to withstand 100 lb. per sq. in., whereas a ton of explosive at 100 yd. range produces a pressure of about $2\frac{1}{2}$ lb. per sq. in. ($1\frac{1}{2}$ tons per sq. yd.), which is enough to knock down a 9-in. brick wall. The bulbs are further protected by being loosely mounted in sheet-steel cubicles inside a substantial building; this ensures that any concussion shock is but a very small fraction of that which they are capable of resisting, so that a pressure great enough to damage them would wreck the whole substation. In regard to secondary effects of aerial bombardment, e.g., shrapnel, owing to the sectionalising of the bulbs, a splinter would be likely to damage only one cubicle of a unit, which would be left in a condition to deal with a large proportion of its normal load. The continual use during the war of rectifiers of this type by Government Departments, steel works, electricity supply undertakings and transport authorities, such as the L.M.S. Railway and the London Passenger Transport Board, sufficiently indicates their reliability under war conditions.

Unarmoured Cables

IN a memorandum, supplementary to that reported by us on July 12th relating to the use of unarmoured cable in the interests of steel economy, the Electricity Commissioners intimate that applications for allocation of steel for armouring (wire rather than tape) should be definitely restricted to the exceptional cases particularised elsewhere in this issue. In unusually difficult situations where covering additional to that prescribed seems to be required, consultation with the cable manufacturers is recommended. There appears to have been some misunderstanding regarding the need to provide a copper earth shield under the metal sheath or else steel-wire armouring in order to prevent danger due to leakage from three-phase high-voltage mains. The Commissioners point out that nothing in the Supply Regulations calls for either of these. Only in quite exceptional cases would the use of unarmoured cables involve any departure from BSS 480 in order to comply with Regulation 7, which deals with the conductivity of metal sheathing and of the fault-current circuit.

Factory Ventilation

IN commenting in our issue of May 24th on a publication of the Factory Department on Factory Ventilation in the Black-out, we referred to the possibly serious consequences of reducing the number of changes of air per hour as a result of fitting vents with light-traps that obstructed the air flow. A new B.S./ARP, No. 31, issued by the British Standards Institution, has been prepared by the Joint Lighting Committee of the Ministry of Home Security and the Illuminating Engineering Society which should give useful guidance on the principles to be followed and materials to be used in the construction of light-traps that do not interfere appreciably with ventilation. They can be quite easily put together with the aid of the illustrations included in the publication.

The Electric Aeroplane

THE legend of the battery aeroplane is apparently still extant. In one form, which has been referred to in the lay Press, the battery supplies current to a 1,200-HP motor which propels the plane at 300 MPH with a flight duration of three hours. Assuming this speed to be the maximum and allowing for a greatly reduced consumption while cruising, the weight of the battery alone would be nearly three times the gross weight of a loaded Hurricane fighter, which has a better but comparable performance, according to data regarding the latter given in *Flight*. The inferences are obvious. The storage battery provides an excellent means of propulsion within its own somewhat special field, but we see no grounds for anticipating that it will furnish our Air Force with a new "secret weapon."

Rate Exaction

OBSERVING that there was a deficit on the Hastings undertaking for the past year, we were surprised to see in the accounts that the usual £3,000 has nevertheless been contributed to the town rates. Apparently this is justified on the grounds that there was a carry-forward from the previous year of £3,484, but the result is that the reserve fund has had to be reduced by £3,000 more than need be. While the undertaking is in the fortunate position of having a substantial reserve, thanks to the active development policy of the undertaking, this extension of the idea of raiding the "profits" seems particularly ill-advised at the present time.

POWER-FACTOR CORRECTION

Special Significance in Wartime

IT may be said that had all concerned done what was necessary or advisable by way of power-factor correction before the war there would be no need for special consideration of the subject now, but this does not help in solving urgent wartime problems. Metal shortage, capital expenditure restrictions, delivery difficulties, space-saving problems and other war contingencies all have a bearing on load conservation towards which power-factor correction can make, and is making, important contributions from both the supply and works engineers' points of view.

In many cases transmission systems which normally would have been satisfactory for many years to come are now being loaded to maximum capacity at short notice with supplies to war establishments, and a power-factor difference between, say, 0.75 and 0.95 is often the difference between being able to accept a war-production load at a minimum of expenditure and the necessity of practically rebuilding a major portion of an existing transmission scheme. By reducing the current in a denser area, reinforcement of the network can obviously be delayed by correction. In many armament factories extensions of production plant can be, and are being, made possible without extensions to the factory main supply and distribution equipment merely by power-factor correction. These are just examples of a vast number of varying wartime problems of which power-factor correction is the common solution.

Power-factor correction developments can, of course, be traced back many years, but they have been largely incidental to other developments. Only during the past few years has correction become a major service—with the establishment of the static condenser industry, in fact—and this has been built up on the economic principle of supply as the result of the growing appreciation of the benefits of high power factor to supply undertakings and their willingness to pass on part of those benefits in the form of specially framed tariffs.

A recent investigation shows that there is still a long way to go and that the benefits are still far from fully appreciated in all quarters. A power station designed for a mean power factor of 0.85 would give only 80 per cent. of its output at 0.70 p.f. We can record an instance of a colliery with a fully loaded 3,000-kVA turbo-alternator which added a 700-HP air compressor driven by a synchronous induction motor running at 0.85 leading p.f. without increasing the power plant capacity.

Shopping areas nowadays, with their numerous small service motors, are very difficult to tackle from the p.f. correction point of view, but what an asset is the factory with a suitably designed correction scheme in such an area! As the capital cost of generation and distribution forms a large proportion of the cost of electricity, the economic disadvantages of low power factor are of great importance.

The inducements, then, to the factory owner or consumer to adopt p.f. correction are special tariffs or tariff conditions offered by the supply undertaking and an appreciation of the overloading of his own cables and equipment. But before such inducements can have any effect there is a very special difficulty with which most consumers' engineers and contractors are now familiar—the necessity of imparting to the non-electrical technical mind some idea of the meaning of power factor.

This seems always to involve the use of analogies of which, we think, there are far too many—in the aggregate they become confusing and it is far better to use just one—and a simple one at that. We are certainly not prepared to advocate the general use of the badly poured out glass of beer illustration—the froth representing low power-factor beer—although we know of cases where this has proved illuminative. It is our experience, however, that because most works managers and engineers are definitely mechanically minded the old textbook mechanical analogy of the tow-path pull out of line to the line of motion of the canal barge, involving normally disposed idle and useful pulls, is the best possible in most cases.

Influence on Tariffs

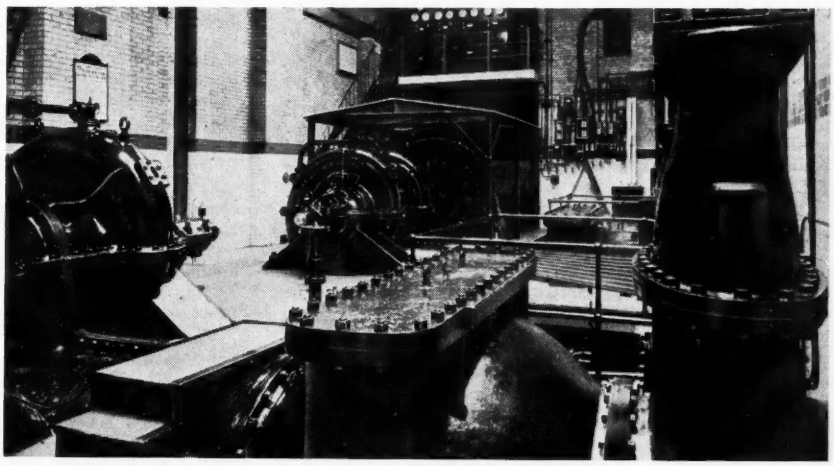
Tariffs must of necessity be a primary consideration in any discourse on power-factor correction—they are likely to remain the chief inducement. Tariffs must of necessity involve considerations more important than power factor, but the remarks on the subject in this article should be considered strictly in the light only of the influence of power-factor correction. Of the vast number of tariffs and tariff conditions framed to deal with power factor we suggest summarisation under three headings, each embracing various modifications. They are (1) kVA maximum demand; (2) flat rate with penalty and/or bonus; (3) wattless unit charge.

We have allowed ourselves to be persuaded that the fairest method of charging is probably the two-part tariff based on kVA maximum demand, because the great majority of supply engineers agree that it is only at peak load that the power factor matters. It is reasonably simple to the consumer and the development of kVA metering equipment has removed many obstacles, although metering may be costly on smaller supplies. For this latter reason there is much to be said, we think, for the scheme involving a flat-rate charge with discounts for annual amounts of, say, up to £250, and a kVA maximum demand tariff for amounts above that figure.

There is one serious criticism to make about many of the bonus and penalty clauses, however: it is that due consideration is not given to the fact that the slope of the cost of supply curve is steeper at the lower power factors. But this objection is removed in those cases where the sliding-scale of penalties for the lower power factor is instituted, although the difficulties of measuring power factor commercially remain and we are afraid that in many of the methods at present employed a compromise has to be sought between accuracy and simplicity.

Finally, the kVAr metering principle seems to be the least popular, at present at any rate (it is still in its early days), and it has certainly given rise to the most serious objections brought to our notice. Reactive kVA measurement requires rather elaborate and costly metering equipment, and this tends to limit its use to very large consumers and bulk supplies. Further, the principle of "sine unit" measurement is an inducement to consumers to correct past the desirable point to unity or even to leading power factor, with a consequent risk of voltage instability on the supply system. Poor voltage regulation at the lower power factors is the more serious matter, however, and is often the direct cause of the adoption of simple penalty clauses by undertakings with long transmission lines.

Perhaps the fact that the grid tariff imposes a penalty for the lower p.f. values, but offers no bonus for the higher figures, is responsible for much of the controversy on the question

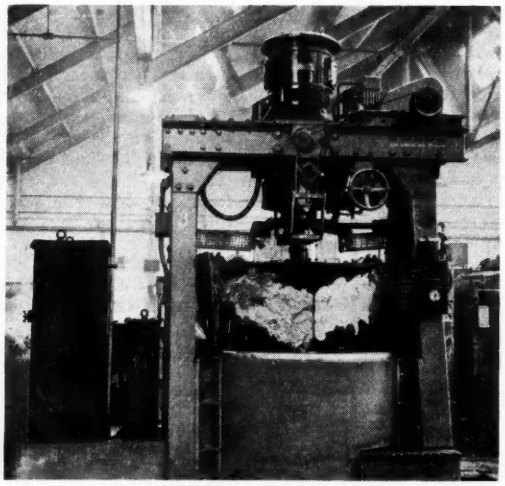


The synchronous motor has a special province in system or part-system correction; large dock pumps with such drives

of the bonus in addition to the penalty. We suggest the answer for any particular case should conform to the answer to the question: Is 0.95 p.f. worth more to the undertaking than 0.85 p.f.?

There can be no doubt that the special significance of power-factor correction at the present time lies in the possibility of reducing loads on factory distribution equipment, and this is emphasised by the fact that it was becoming increasingly recognised before the war that I^2R losses and improved factory system regulation alone provide sufficient reason for the adoption of power-factor correction. And we certainly agree that the works manager who is sufficiently progressive to hold this view is justified in making his claims on the supply undertaking where that is necessary.

We are constantly becoming acquainted with cases where effective factory installation capacities have been increased by 10 to 40 per cent. by the installation of correction equipment which is paid for by tariff concessions alone, i.e., the capacity is actually increased without extra cost. This emphasises the wartime considerations to which we have already referred. But there is a still more important point to be considered from this special factory-loading angle. Sound engineering principles have to give place to the paramount consideration of urgency of production in many armament factories to-day, and there is no other possible course than to take whatever production equipment is available to do the job. The result is that often a factory is equipped with hundreds of machine tools each with, say, a 40-HP individual induction motor drive, while the maximum duty load on the machine may not exceed, say, 5 HP power. Can a stronger case possibly be made for power-factor correction?



The most efficient precaution against leading current on the system at light load is automatic condenser control; a 10-point automatic control cubicle

Even if it were possible within the compass of this article it would defeat the object of the article to attempt a comparison between the different methods of power-factor correction, but the following broad observations on the types of equipment available are offered as a guide to an appreciation of the varying problems involved. From the viewpoint of the types of equipment available there is the wide classification—static and rotary equipment.

We believe that the increased use and commercial development of the static condenser in recent years, largely consequent on overcoming earlier troubles due to ionisation in the dielectric, has done as much to advance the cause of power-factor correction generally as it has to further its own particular sphere of activity. Low capital, installation and maintenance costs, low losses and flexibility are among the the reasons for its growing popularity, and it seems that it is better to use a number of smaller condensers rather than one large unit, because a short-period failure on the latter might well result in the loss of a whole year's savings.

Choice of Equipment

The choice between static and rotary equipment involves consideration of many matters other than pure power-factor correction, some of them more important, and there is no clear line of demarcation between the two classes; every case must be considered individually. Load characteristics, sizes of motors, new or existing plant, machine speeds, space conservation and, particularly in wartime, delivery times must each and all take their part in the deliberations. Experience does suggest, however, that the larger the motor, in the case of a new installation, the better is the case for rotary equipment, and that where all the motors in a factory are comparatively small there is a straight case for the static condenser. A mixture of large and small motors often points to a combination of rotary and static equipment, but, dependent on whether the installation is new or not, this condition often presents a case for correction by the large motor or motors for the smaller unit as well by balancing leading against lagging current. The synchronous motor has a special province in this way in new installations. For existing machines the phase advancer excels in obtaining increased output from the motor, while the compensated motor often represents a good commercial compromise for a wide range of drives up to, say, 300 HP or so. It is extremely important to remember that all good makes of motor have a reasonably good power factor at full load, so that the solution, wholly or partially, to the correction problem might easily depend upon a careful selection of types and sizes of motors in the first place.

We have attempted a number of classifications of types of correction equipment, but none of them is conclusive. The following is a brief summary of a classification according to size and speed for both new and existing plant, and we believe it will constitute a useful guide if an eye is kept on comparative capital and running costs for each set of conditions. In the case of large constant-speed motors for new installations the synchronous motor is outstanding because the power factor is adjustable, and the motor is nearly always more efficient than the induction motor and is often not more expensive. For variable speeds for a large drive on a new job the induction motor with a commutator slip regulator offers both excellent correction and speed variation. An alternative to this in a few cases where the variation is considerable and close control is wanted is the synchronous condenser. For large machines the cost is low but the losses are high. About 1,000 kVA is probably the lower size limit.

The synchronous motor also holds a good place for constant speeds in the upper medium-size field (say, down to 150 HP), but it is ousted on the lower scale by the compensated motor for down to, say, 40 HP. For variable-speed drives in the medium-sized field the commutator motor has a good reputation, for although its primary function is variable speed it inherently has a high power factor. The phase advancer should have special consideration for all correction schemes for large and medium existing motors. There is often a case for the static condenser for each of the above sets of conditions and there is nearly always a place for it on the installation of smaller motors.

Point of Correction

It is at first a little difficult to see why there should be any question as to the best place, theoretically, for the application of correction, because obviously if correction takes place at the point of the error then everything in circuit benefits. It should be remembered, however, that supply considerations have been, and still are in many quarters, the only inducement to correction, so that correction at the point of supply has become a fixed idea. The best place theoretically is seldom commercially sound, however, and the final choice is nearly always a compromise, mainly on the score of expense, but also sometimes because at the motor the condenser is liable to be knocked about.

From the space point of view there is often something in the idea of tucking the condenser out of the way in the substation, but good compromise is often correction at the main distribution boards so that relief is obtained on the feeders and equipment from the substation to the boards, but we have a leaning towards the scheme embracing smaller condensers propressively along bus-bar distribution lines.

The principles of diversity also play their part even in power-factor correction and with decentralisation of condensers the overall condenser capacity tends to become increased. This often results in leading current on the mains at night and other light-load times. One remedy for this is to install the condensers individually at the motors so that they are switched off with the motors; another scheme is remote control from the substation or automatic control.

We have shown that the individual condenser at each motor, although ideal technically, is economically unsound, particularly in a machine shop, for instance, where there are large numbers of individual drives. In such cases it is found that 60 kVA is an economical size of condenser and one that permits very accurate control. For remote control each condenser may be fitted with an air-break contactor to facilitate the remote switching. This system necessitates the part-time duty of an operative which is overcome by automatic control. A typical system employs a two-element relay, consisting of a balanced reactive element, and a powerful induction motor driving a camshaft which operates a sequence of switches in the condenser contactor control coil circuit.

DOMESTIC LOAD

New Light on its Characteristics

By G. O. McLean, M.Eng.

THE "ill wind" of war has blown away some of the smoke screen veiling supply statistics and analyses of loads and costs, and consequently it ought to remove doubts in engineers' minds about domestic electrification. The cessation of street lighting and of late shop-window lighting and the earlier closing of shops and offices, while causing a heavy drop in the sales of electricity, have also made the task of analysis easier and thrown new light on the domestic electrification problem.

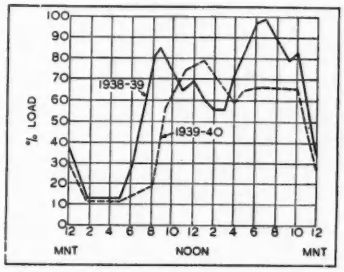


Fig. 1.—Load curves for winter peak-load days

This is particularly noticeable in a "dormitory" borough where the industrial power load is small and unaffected by war conditions. Fig. 1 shows that the peak time has moved from evening (week-day) to lunch-hour (Sunday). To the analyst this is most helpful as the new peak time reduces the number of variables or classes of load to a minimum—namely, domestic load (excluding lighting) and probably a little space-heating for frost protection.

Unfortunately, the bald fact of the coincidence of the year's peak and the cooking peak has scared some supply engineers who have not analysed the curve of the whole day, and have argued that cooking—or at least, they say, any incremental cooking load—must therefore bear the full "fixed-charges" portion of the grid or other purchasing tariff. On the contrary, the full facts should dispel pessimism, and encourage the progressives to redouble their development efforts towards complete domestic electrification.

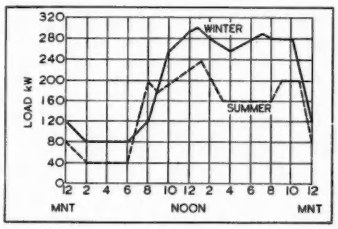


Fig. 2.—Load of all-electric estate

A pre-war view based on theory and isolated experiences was that an average consumption for electric cooking was one kWh per person per day, or for the average-sized family of one or two children and parents an annual consumption of 1,000 to 1,500 kWh. Owing to diversity between types of load and the habits of the consumers with cookers, the demand per cooker (5 to 7 kW size) was held to be 0.2 kW at the time of an undertaking's peak. This gave a theoretical cooking load factor varying from 58 to 87 per cent. With total supply costs as high as £10 per kW, plus 0.3d. per kWh, an overall selling price of 0.75d. per kWh was an economic proposition on such a hypothesis.

In 1932 and again in more detail in 1938 (*I.E.E. Journal*, Vol. 82) Mr. J. N. Waite published the results of the Sutton Trust Estate at Hull. The average "on-peak" demand of a £13 rateable value house with cooker, seven lighting points, wash-boiler and one plug point was 0.21 kW, and the load factor was 50.22 per cent. (some winter cooking being done on a coal range). The high value of diversity was illustrated by the individual consumers' load factors being only 2.1 per cent. There was no attempt to hide the fact that *if* the system peak had been coincident with the estate peak the load factor would have been only 16.02 per cent. Using the same hypothetical costs figure, the economical selling price would have risen to over 2d. per kWh.

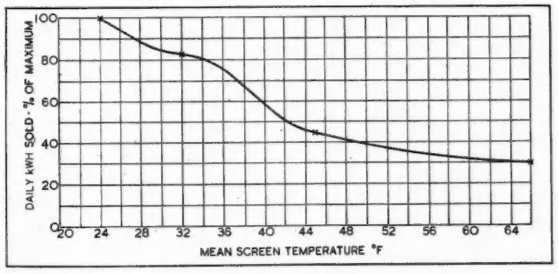


Fig. 3.—Domestic kWh sold in relation to mean temperature

Considering fig. 1 and the 1939-40 curve, particularly where the domestic peak does coincide with the system peak, how much of the peak indicated is due to cooking? Some might say that part which exceeds the average daytime load, but such an assumption would ignore the possibility that dining-room radiators not normally on for the rest of the day may be switched on at meal times, and this applies to all domestic premises so equipped.

It is suggested that 80 per cent. of the peakiness (not the same thing as peak load itself) is a reasonable proportion to debit to cooking. If that load in kW is divided by the number of cookers connected to the system, the cooker diversity and the load factor follow from a knowledge of the total cooker loading and average annual consumption. For the particular case under consideration, the figures are roughly 0.5 kW demand per cooker, giving a diversity of 14 for a cooker loading of 7 kW and a load factor of 34.2 per cent. for a consumption of 1,500 kWh. It is submitted that, even when thus isolated, the cooking load is worth striving for, more especially when contrasted with lighting and heating alone, and that its value increases if combined with water-heating and other domestic loads.

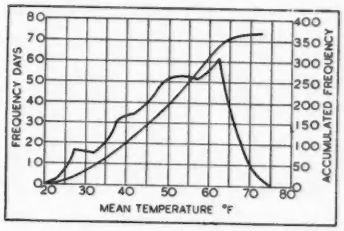


Fig. 4.—Temperature frequency distribution (London)

There have been many published analyses of the consumption and costs of individual all-electric houses, but they do not take into account diversity between consumers in that class. Fig. 2 shows the load curves for summer and winter days of an estate of all-electric flats (140 occupied). In this case each flat is equipped with a 7-kW cooker, a 2-kW immersion heater, two 1-kW radiators and seven lighting points, while many have 3-kW wash-boilers, 1.5-kW kettles, 0.5-kW irons and additional 2-kW radiators.

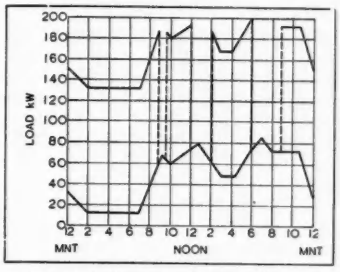


Fig. 5.—Effect of off-peak heating

Though the estate peak load occurs on Sunday at midday, it should be noted that the load factor based on that peak is 44 per cent. and if based on a weekday evening peak, which before the war coincided with the system peak, it was 58 per cent. Further, the tenants of these flats are all of the same financial class and have similar occupations and domestic habits, and so diversity is not at its highest. Despite this and using the lower load factor (based on the Sunday peak) an economic selling price of less than 0.95d. per kWh is required to balance the hypothetical costs given above. This example shows the value of selling water-heating in conjunction with cooking, and given the correct selling price—such as the average domestic two-part tariff—it is not an insuperable task.

The alternative development of such domestic load is merely lighting and heating and the poor characteristics of such loads are not generally appreciated unless analysed. A study of a whole year's load curves will show that shop and business lighting hours vary from nil to a maximum of eight hours in winter, and domestic lighting from one to two hours in summer to a maximum of nine hours in winter. The severity of the load varies from zero to unity for shops and business premises and from 0.4 to 1.0 for domestic premises.

Combining severity (kW load) and duration (hours) we arrive at annual energy (kWh) sales for each class and thus at their load factors. These are as low as 10 to 15 per cent., diversity in each class having been accounted for. There is some diversity between the two classes which raises the load factor slightly, but the maximum attainable in a non-industrial area appears to be 20 per cent.

Consideration of the domestic heating load reveals characteristics just as bad as, if not worse than, lighting. Owing to the extreme cheapness of the small bar or bowl type of electric fire, the great majority of domestic consumers possess

(Continued at foot of next page.)

SHOWROOMS AND THE WAR

An Example of Co-operation

By J. Allen

THE possible utility of electricity showrooms as a factor in the war effort might at first glance appear to be almost insignificant and yet, if these activities are directed into the right channels, showrooms can play a comparatively important part in assisting in the country's eventual victory. Proof of this statement has been made very apparent in Bury during the last few weeks, particularly in connection with a campaign recently organised in the town in which the Bury Corporation electricity showrooms played a prominent rôle. This campaign was in connection with National Savings and was instituted by the Local National Savings Committee in collaboration with the borough treasurer and director of education.

In the first place, contact was made with the local postmaster and various working models were obtained from the postal authorities for exhibition in one of the electricity showroom windows. These models were very cleverly constructed and proved to be a great attraction; as many as thirty to forty people at a time were counted outside the showroom window whilst the display was on view. A detailed description of the models would take rather too much space, but in view of the fact that particulars should be available from all postmasters, it is sufficient to say that they embodied a very wide variety, all, of course, dealing with the National Savings Movement. These models are held by the postal authorities for exhibition in various parts of the country.

The Post Office cinema van was also in Bury during the period of the week's campaign; this travelled to points previously advertised and gave open air talking film shows dealing with National Savings.

It was decided to give National Savings film shows in the showrooms during the week and performances were arranged to commence at 3.15 p.m. and 7.30 p.m. each day. In order to make the shows more comprehensive, a short cooking demonstration was introduced fitting in with the Food Economy Campaign of the Ministry of Food. Finally the E.D.A. film "The Good Old Days" was also "put on." The showroom programme as finally arranged was as follows:—

(1) Three films dealing with National Savings (obtained from the National Savings Committee, London). Time 40 mins.

(2) Short cookery demonstration on wartime food problems. Time 30 mins.

(3) "The Good Old Days." (E.D.A.) Time 20 mins.

These gave a total programme time of about an hour and a half. It may be mentioned that if the Ministry of Food had been in a position to supply films on food economy, one or more of these would also have been included in the programme. Prior to the commencement of each performance, a short introductory chat was "put over" by some prominent resident of the town. The Electricity Department was registered as an official agent of the National Savings Movement and inside the showrooms a stand was erected at which Savings Certificates could be purchased by the public.

Not only can the showrooms be used in the war effort but the members of the sales and showroom staffs themselves can also be utilised in many directions. During this campaign a special exhibition of the work of local schoolchildren was arranged in the Art Gallery. This took the form of posters, paintings, sketches, models, &c., on the subject of National Savings and the showroom staff was called on to arrange a separate display on the same subject in an adjoining room. The whole of this exhibition, including the erection of the stands and all details of the display, was left entirely in the hands of the showroom staff. Previous to this, a Ministry of Information exhibition had been held in the Art Gallery and here again the showroom staff was called in to arrange another display on National Savings.

Here is yet another direction in which the efforts of the showroom staff have been of value. Some few weeks ago, the Mayor of Bury, in connection with the Anglo-French Ambulance Corps, organised a fund for the purchase of an ambulance costing £500. The organising and publicity for this scheme was placed in the hands of the staff with the result that at the end of only four weeks £1,129 had been collected—more than enough to buy two ambulances.

It might be argued that showroom staffs have enough to do without taking on work of this type, but it will be realised that with the many restrictions which wartime conditions have imposed, the duties of the majority of them have been lessened considerably, but in any case the satisfaction of completing tasks of this sort more than compensates for the extra time and worry. It seems reasonable at the present time to assume that the officer responsible for the peacetime advertising of a go-ahead Department is just the man to be employed in the advertising of the many local wartime activities.

Electricity showrooms and staffs throughout the country are doing much useful work in connection with the National Food Economy Campaign, but why limit their activities to this particular branch of vital work? Many more avenues are open in which they could be usefully employed. It would appear that a great advertising force which would be invaluable to the country is being largely ignored in many cases, due entirely to a lack of appreciation of the true position.

Domestic Load (*Concluded*)

one or more of these appliances. Incidentally, is it not possible to foresee, from a study of the comparative amounts of material and workmanship, the time when small water-heaters and even cookers may be half and even a third of their present price because of the numbers demanded?

Do the possessors of these small fires use them regularly and consistently? Despite the undoubted advantages of portability and immediate heating, the answer is still, unfortunately, "No." Fig. 3 shows the variation of the Sunday output (assumed to be domestic) with mean shade temperature (i.e., the mean of the maximum and minimum temperatures recorded in a standard external screen, not the mean of half-hourly or hourly readings of the waking hours from 6 a.m. to 11 p.m.). The day of maximum output (for Sundays) or maximum domestic kWh sold is used as the basis for the ordinates scale, thus transferring the case from the particular to the general.

It will be noticed that the curve has two nodes, set about 32 and 45 deg. F., which I suggest are caused by abnormal use of these small fires. Allowing 5 per cent. between the mean temperature graphed and the mean of the daytime temperature, it is suggested that these fires are used a great deal when the external temperature falls to 50 deg. F. for short-period heating, and then again as the temperature nears freezing point they are used to supplement other forms of heating. It will be realised that were there no heating load, the curve would probably be a straight line higher at the low temperature end than the other on account of the number of daylight hours, but the slope would not be so steep.

Another important point about this curve is in connection with its minimum ordinate. This value is an indication of the extent of domestic electrification, as both lighting and heating loads are almost non-existent in the summer, whereas cooking and water-heating loads are only slightly reduced then.

To give a clearer idea of the value (or otherwise) of this heating load and its times or periods of application, a frequency distribution curve of mean shade temperatures for the last municipal year (April 1st, 1939, to March 31st, 1940) is shown in fig. 4, together with accumulated group figures. Five-degree groups have been taken, and their frequency plotted against the mean of the groups—i.e., the number of days with a mean temperature between 35 and 40, viz., 31 days, is plotted against 37.5 deg. The shape and especially the skewness, with an apex or mode at 62.5 deg., instead of 45 deg., the median of the whole range, may surprise some readers. The point to which I wish to direct attention is that the number of days last year (including an admittedly severe winter) when the mean temperature was below the nodal point of fig. 3, viz., 45 deg., was less than 150, and the number below 32 deg. was less than 50. This strikingly demonstrates that the resultant annual load factor of the heating load must be very low, and therefore, if this load is going to be carried, it needs backing up with other load and preferably summer load.

Load Factor for Luxury Flats

A large block of thirty luxury flats (only twenty occupied) so equipped gives the type of load curve shown in fig. 5. Considering the continuous (lower) line first, it will be noticed that the demand per flat is higher and the resulting load factor lower than the corresponding figures for cheaper property shown in fig. 2. This is completely altered by the additional off-peak heating load, as is clear from fig. 5. Actually, in this particular case, the annual load factor is raised to 80 per cent., though the central heating is limited to all living rooms (i.e., bedrooms not equipped) and to a season of 210 days.

The heating plant is of the electrode-boiler type, and its load is adjusted so that its service thermostat does not bring the load off in any of the normal valleys, such as night-time or early afternoon. Remote control is effected from the main attended substation, and is backed up by the usual time-switch control. The loading, even for partial central heating, is as high as 6 kW per flat, and it may be argued that such equipment is beyond the scope of normal domestic development. There are, however, numerous properties, domestic and business, where this development could take place, and these alone would make a vast difference to the curves in fig. 1.

Finally, stress must be laid on the need for development of summer load, for however flat we may make the curves of fig. 1, unless we also raise the high temperature end of fig. 3 the load factor over the year will only be slightly improved.

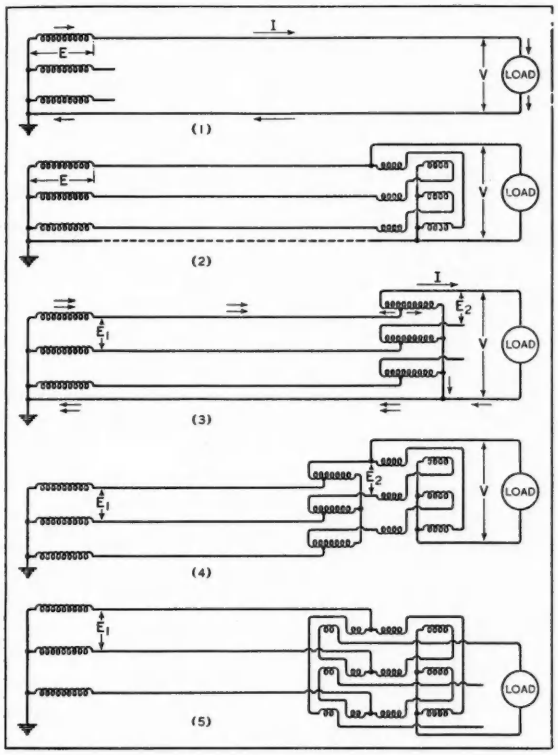
DISTRIBUTION IN FACTORIES

Single-winding Static Apparatus on Four-wire Systems

By A. L. Morris, A.M.I.E.E.

STATIC balancers and auto-transformers have a more restricted field of application than double-wound transformers, but the lower capital outlay and the lower electrical losses often justify their utilisation. Three-phase static balancers are being increasingly employed in factories having a number of local four-wire systems. Not only is the main distribution system simplified by the elimination of the fourth wire, but poor voltage regulation is avoided, as the balancer distributes any neutral current over the three-phase lines, while the Home Office regulations are satisfied if the main supply neutral alone is earthed.

A three-phase balancer is far cheaper than a three-to-one-phase transformer for interposing between a single-phase load and the three-phase supply, and gives the same current distribution in the supply feeders. The single-phase voltage given by a balancer is, however, restricted to 57.7 per cent. of the three-phase line voltage. Where a four-wire distribution system is already in existence a static balancer is justifiable if there is sufficient reduction in voltage drop to permit increased feeder loading. For example, consider a unity power-factor phase-to-neutral load of 50 A situated at the end of a long feeder (fig. 1). $V=E-I\ (R_l+R_n)$, where V is voltage across the load, E is phase-to-neutral voltage at supply transformer, say 230 V, and R_l and R_n are the resistances of the line and neutral wire, say 0.12 ohms in each case. Then $V=218$, equivalent to a drop of 5.2 per cent.



Connection diagrams

By connecting a static balancer between the load and the feeder as shown in fig. 2, $V=E-IR_l-\frac{I}{3}\left\{\frac{3R_bR_n-R_l\,(R_l+3R_n)}{R_l+3R_n+R_b}\right\}$, where R_b = phase-to-neutral resistance of balancer, say 0.2 ohms. Thus $V=223.6$ V, giving a drop of only 2.8 per cent. The incorporation of a balancer has, therefore, reduced the regulation from 5.2 to 2.8 per cent. If the original regulation was satisfactory, then with the balancer an unbalanced loading of 93 A is permissible without exceeding 5.2 per cent. drop.

When there is no connection between the supply neutral and the balancer neutral, the drop in voltage is determined by $V=E-IR_l-\frac{I}{3}\ (R_b-R_l)$, and for the example chosen $V=222.7$.

Out-of-balance current should always be specified as it is one of the basic factors in determining the size of a balancer, but it is usual to assume it to be one-fifth of the normal balanced current of a feeder. When a balancer is specifically required to act as a three-to-single-phase transformer, then the out-of-balance current is the single-phase load current.

The relative size of a balancer can be expressed in terms of the kVA rating (W) of an equivalent double-wound transformer, *i.e.*, $\frac{IE}{\sqrt{3}\times1{,}000}$, or the equivalent size of a three-phase static balancer is 57.7 per cent. of the out-of-balance single-phase load. For the example considered $W=6.66$ kVA, whereas the single-phase load is 11.5 kVA.

The small size of an auto-transformer in proportion to power transmitted makes its use attractive when only a small increase in voltage is required. Thus, when a change-over from a non-standard to a standard voltage is contemplated (*e.g.*, from 346 to 400 V), provided the unbalance does not exceed about 10 per cent., operation will be satisfactory. At higher unbalanced phase-to-neutral loadings, however, voltage regulation is extremely poor, due to two limbs of the auto-transformer acting as choke coils. Tying the auto neutral to the supply neutral avoids this effect as the unbalanced current can then flow right back to the supply transformer (fig. 3). Except for the voltage step-up, this diagram is the same as fig. 1 as regards current distribution, and voltage drops due to the poor utilisation of the feeders will occur. Star-connected auto-transformers are therefore discouraged on four-wire systems.

Comparing the size of an auto-transformer with the auto balancers mentioned later, suppose a 200 A three-phase load at 400 V is desired and the supply voltage is 346 across lines, the kVA of the load is 139 and the equivalent output of the auto-transformer is

$$\frac{\sqrt{3}\,E_2\,I}{1{,}000}\left\{\frac{E_2-E_1}{E_2}\right\}=18.8\text{ kVA},$$

where E_1 and E_2 are the primary and secondary line voltages. The unbalanced neutral current must not exceed 20 A.

A static balancer can be connected across the outgoing terminals of an auto-transformer in order to obtain satisfactory four-wire distribution. The balancer converts any phase-to-neutral unbalance into one across phases, when no choking effect takes place, since the transformer windings carry opposing currents (fig. 4).

As the size of the auto-transformer depends upon the balanced three-phase load, while that of the balancer depends upon the unbalanced load, both conditions must be known before the total size can be determined.

Then, $W=\frac{E_2\,I}{1{,}000}\left\{\frac{\sqrt{3}\,(E_2-E_1)}{E_2}+\frac{r}{300}\right\}=24.1$ kVA, where E_1 and E_2 are the three-phase line voltages (346 and 400), r = out-of-balance current per cent. (usually 20), and $I=200$. The balancer and auto-transformer are usually separate units, but can occupy the same tank.

Interconnection of the windings of a double inter-star auto-balancer (fig. 5) enables both a voltage boost and four-wire loading to be obtained. The auto-balancer is thus free from objectionable voltage drops when supplying either a balanced or unbalanced load. Like the previous auto-transformer and balancer combination, the loading of this type depends upon the balanced and unbalanced loads, but there is a further complication. The windings must be capable of protection by fuses or overload trip coils from phase-to-phase and phase-to-neutral faults.

To protect the windings against overloads the same equivalent size of unit must be employed for any boost up to 20 per cent. Thus, within that range no advantage accrues from the auto-connection and probably a separate auto-transformer and balancer will be cheaper.

If the voltage boost is less than 20 per cent., then the equivalent rating W is given by $\frac{IE_2}{3{,}000}$, where I is the balanced three-phase load current. For a voltage boost greater than 20 per cent., $W=\frac{2IE_2}{1{,}000}\left(\frac{E_2-E_1}{E_2}\right)$ where $\frac{E_2}{E_1}$ = voltage boost. As in the example given $\frac{E_2}{E_1}$ is less than 20 per cent., $W=\frac{200\times400}{300}=26.7$ kVA.

Radio for Pedestrians

AFTER long experiments the Radio Corporation of America has evolved and put on the market a "personal radio," a self-contained receiving set weighing only four pounds. The set sells for $20. It is less than 9 in. long, 4 in. wide and 3 in. deep, is equipped with a strap so that it may be slung over the shoulder, and resembles a camera.—*Reuter's Trade Service.*

War Damage

Mutual Aid and Taxation

DURING the Committee stage of the Finance Bill in the House of Commons last week, Mr. Woods moved an amendment to Clause 12 (Disallowance of certain payments in respect of war risks) to provide that any mutual aid or insurance scheme to enable business, or industry, in the event of war damage, dislocation or other hindrance arising from the war, shall continue to function, where such mutual aid or insurance scheme has the approval of the Treasury.

In the debate which arose on the amendment, Mr. Levy said that he was speaking for, and with the authority of, the Joint Committee of Electricity Supply Associations, and the Joint Conference of Public Utility Associations, which included electricity suppliers for the whole of the country. The Chancellor of the Exchequer knew that they were formulating a scheme whereby any war damage could be repaired during the war out of a pool, in view of the fact that any compensation for damage would not be recoverable from the Government, if, indeed, it were recoverable, until the end of the war.

They were proposing by means of legislation to create a pool by a levy on the whole of the industry. Under this Clause, that levy, which would ordinarily form part of expenses and could be assumed in the same sense as an insurance premium against catastrophe, would be disallowed. He did not think that was the intention of the Chancellor of the Exchequer. He (Mr. Levy) asked that the whole matter should be considered before the Report stage, and that the Chancellor would receive a deputation from these large organisations which would explain to him the position with regard to this levy and how it was intended to operate, and to see whether he could make it an expense in the form of an insurance premium, instead of coming to the conclusion right away that it should be disallowed.

The Treasury View

Capt. Crookshank, Financial Secretary to the Treasury, in his reply, said that, as he understood the position this scheme had not yet been formulated. It was, therefore, impossible to say how it might or might not be affected by the Clause. If the scheme which was outlined at a discussion which took place some little time ago was formulated on the lines then proposed, it certainly would constitute an arrangement such as the Treasury was trying to exclude from taxation advantages by this Clause and payments under that scheme would not be allowable for taxation purposes. The scheme, however, might have been modified since then, so he could not make a pronouncement about it.

Sir Herbert Williams said that he had been asked to intervene in this matter by the secretary of the Incorporated Municipal Electrical Association, who was also secretary of the Joint Committee of Electricity Supply Associations, which brought in the companies as well. They had for some time been considering the difficult problem which would arise in the event of serious air-raid damage to a large power station. It was conceivable that the amount which would be required for the repair of that station might be a sum outside the capacity of the undertaking. The idea was that the whole electricity system of the country should devise a scheme of mutual aid, which would be very much in the public interest, because the restoration of this service would be an urgent necessity.

After a great deal of discussion the scheme had developed on these lines: that there would be no premium payable in advance, but a liability to pay a levy to meet the interest and sinking fund on any capital sum which might have to be raised to meet the damage. These levies would continue for years after the war, when Excess Profits Tax had gone. The justification for the attitude of the Financial Secretary to the Treasury was that under this scheme the Government would, in fact, be paying the premiums, but that would only be during such time as the levy was being paid and the Excess Profits Tax was also in force, and that was a consideration which deserved attention.

Legislation Necessary

The scheme proposed could not be carried without legislation, and he did not think a Bill to promote a mutual insurance scheme for public utility concerns could include a proposal that taxation should be remitted, and therefore he felt that the Finance Bill provided the right occasion for dealing with the matter. There would be other Finance Bills, the next one, he presumed, before Christmas, and by then he imagined that the scheme to which he had referred would have reached its final stage. As what had been proposed by the electricity industry might be copied by other public utility concerns, he asked the Chancellor not to close his mind to certain problems. He was right to prevent people from inventing an insurance fund in which they could "park" a lot of money on which they had not paid tax and share it out after the war, but if it was a legitimate scheme designed to meet what might be an urgent need, the Chancellor should give the matter further consideration.

The evacuation of people from certain areas had brought many electricity undertakings, both company and municipal, into a parlous condition. In many coast towns undertakings would incur heavy losses. Though he was not familiar with the details of it, there was under consideration a proposal by which undertakings in the more prosperous areas, some of whom had been made more prosperous by what had occurred, should come to the aid of those which had been adversely affected. That proposal was only in the tentative stage, but it would be unfortunate if it were to be destroyed because the Chancellor said that any such expenses could not be regarded as expenses to be chargeable against revenue.

The Chancellor of the Exchequer promised to examine any proposal put forward by industry, but he could not assent to any proposals which would make any large change in the legislation which the House had already embarked on.

The amendment was withdrawn and the Clause agreed to.

Registration of Labour

Many Electrical Classes Affected

THE Minister of Labour and National Service has made the Industrial Registration Order, 1940, which requires that all men of 21 and upwards engaged in certain skilled operations shall register at an Employment Exchange between August 19th and 23rd; most of the exchanges will be kept open until 8.30 p.m. for the purpose. The Order exempts from registration men engaged wholly on Government work during the registration period and those engaged in shipbuilding, ship repairing, iron and steel or non-ferrous metal manufacture, or with the main-line railway companies or the London Passenger Transport Board. The Order applies to all men between the ages of 21 and 65 who are capable of work and have been employed in any of the registrable occupations for not less than twelve months during the past twelve years, including men who are now employers of labour working on their own account, as well as men who are now in other occupations or retired.

Employers of men affected by the Order are required to furnish a list of such men to the nearest Employment Exchange by August 28th, together with a certificate that every other man employed by them in the scheduled occupations was engaged wholly on Government work during the period of registration. Apart from the excepted undertakings this applies irrespective of the nature of the employer's business and covers local authorities. Employers are obliged to exhibit posters calling attention to the Order.

Occupational List

The first schedule to the Order gives the occupations covered; they are as follows:—Brass, bronze, aluminium and other non-ferrous metals, finisher, fitter; coppersmith; core maker; die caster; draughtsman (engineering, jig or tool); electrician (including wireman); fitter, assembler, erector, marker-out (engineering and kindred trades, including electrical); forgeman, including power hammer smith, forge hammerman, forge pressman, hot stamper, hot drop stamper, drop hammer smith, drop forger; inspector, tester, viewer, examiner (engineering and kindred trades, including electrical); instrument maker or assembler—all kinds including scientific, optical, surgical, dental, electrical, wireless, watch and clock, telegraph, telephone; leadburner (chemical plumber); lens worker, prism worker; machinist, including driller (boiler, constructional); metal annealer, hardener, temperer; metal machinist, including turret lathe operator, capstan lathe operator, miller, borer, grinder, planer, shaper, slotter, driller; millwright, maintenance man, metal); moulder (iron, steel, brass or other non-ferrous metals); power press operator (metal); sheet iron worker, sheet metal worker, including tinsmith; toolsmith; toolmaker, press toolmaker, die sinker (cutter), jig or gauge maker; toolsetter (machine or press tools); turner (metal); welder (gas or electric).

If men in these occupations are not sure whether or not they are engaged upon Government work they must register. Registration does not necessarily imply transfer; many kinds of work, apart from Government work, are considered to be of national importance, and it would be undesirable to move men engaged in such work. In this category fall many men concerned in production for export or the supply of power and light. The purpose of registration is to put the Ministry of Labour in a position to use every available skilled man in filling the present and future demands of the armament factories.

In the meantime action is proceeding on three other lines. First, the Ministry, by means of its Inspectors of Labour Supply, is seeing that factories engaged upon Government work are not employing an undue proportion of skilled labour and that skilled labour is being fully used. Secondly, it is investigating factory capacity with a view to bringing into use workshops and machines which are at present not fully occupied. This is being done by the Area Boards under the Industrial Capacity Committee of the Production Council. Thirdly, the problems of training are being handled with a view to up-grading men and women with some skill to higher stages and giving men and women without previous engineering experience the various degrees of skill required to fit them for munitions work.

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Vacancies and the Middle Aged

FURTHER to my letter published by you on August 9th. I duly presented myself for medical examination for re-entry into the Navy. I was, however, informed by a Ministry of Labour official at this interview that although disengaged I was in a "reserved occupation" and therefore could *not* re-enter.

Thus we are apparently "too old" for industry, but having had active service experience, the service will have us again if we are fit. The Ministry of Labour jams this outlet. What are we over 45s to do? TOO OLD.

August 9th.

With reference to the correspondence which has appeared on this subject in the ELECTRICAL REVIEW from time to time since the war started, one has only to notice the "Situations Vacant" advertisements during this period in various periodicals to be aware that there are certain employers who are not going much out of their way to free men for more important national service. They must still have their supermen; medical examination, age limits and educational qualifications are still considered important for quite simple jobs.

During last week-end a London suburban maternity hospital advertised for a non-resident engineer requiring amongst others the following qualifications:—Age under 40, the passing of a medical examination, full apprenticeship, and first-class B.O.T. certificate. Surely at the present time a man with such qualifications could be of much more use to the country than on a pot and pan mending job in a small institution. I have always been of the opinion that B.O.T. certificates were instituted to ensure safety at sea, and not as a qualification for simple land jobs. I am saying nothing against the middle-aged marine engineer who wants to settle down ashore. I think that a lot of these jobs on running and maintenance work could be filled by older men on a temporary basis; in any case, this would give the Service man a better chance on demobilisation. After the last war I had a long spell of unemployment after demobilisation when I found all the jobs that were any good held by people who had stayed at home.

Addington, *August 13th.* W. CHEESEMAN.

Lamps in A.R.P. Shelters

A question of some importance with regard to A.R.P. shelter lighting is raised in your issue of August 9th. On page 116 there is a report of the proceedings at a meeting of the Preston R.D.C. on the subject of the proposed use of car batteries for lighting shelters. The use of oil hurricane lamps had been criticised by the Council on the grounds that they caused smoke and used up oxygen. In spite of this the motion to adopt electric lighting, obtaining current from car batteries, was rejected because it was disclosed that the Regional Commissioner had made a stipulation that hurricane lamps must be used.

It would be interesting to know the reasons for this decision. Hundreds of shelters erected by public bodies and industrial firms have been equipped with emergency electric lighting systems in preference to any form of lighting which involves the use of naked lights. It is, of course, possible that it was considered that storage batteries might run down at a critical time if they were not systematically charged, but this applies equally well to hurricane lamps, which have to be regularly filled and kept trimmed.

Where electricity is laid on to the shelters the most efficient system is to use a complete emergency lighting set, of which a wide range in available, and which incorporates automatic battery charging equipment. Where electricity is not installed, some Councils adopt a very efficient system whereby the batteries are kept regularly charged at a central charging station. C. W. V. DAVIS,

London, W.C.2, *August 13th.* for PHILIPS INDUSTRIAL.

Electric Gas Lighter

Before the correspondence on this subject is closed I should like to state that I used one of these lighters 35 years ago, but did not regard it as a success. Due to inadvertently coming into contact with the gas flame the "points" were quickly carbonised and it was necessary to push the ratchet several times with the thumb before ignition was obtained.

I eventually discarded the lighter as a nuisance.

Glasgow, *August 9th.* ALEX MILNE.

Control of Engineering Firm

IN the Chancery Division on August 2nd Mr. Justice Bennett granted an injunction to E. H. Jones (Machine Tools), Ltd., of The Hyde, Hendon, restraining Mr. E. C. Farrell and Mr. E. W. Muirsmith, who were stated to have been appointed by the Ministry of Supply, from interfering with the control and management of the business and affairs of the company and its banking account, and from instructing the company's bank not to honour cheques drawn in the ordinary course of business on the company's account.

Last week Mr. H. O. Danckwerts applied *ex parte* for leave to serve notice of motion for an order discharging the injunction on the ground that the Regulation held to be invalid had been revoked by the Minister of Supply and a new Regulation substituted. He asked that in the meantime the injunction should be suspended, and later in the day, when Mr. Spens, K.C. (for the plaintiffs) was present, Mr. Justice Bennett suspended the operation of the injunction until Tuesday.

When the matter again came before Mr. Justice Bennett on Tuesday the injunction was discharged by consent and all proceedings stayed. Costs were awarded to the plaintiffs.

Mr. Spens said that the substituted regulation met the two points which the plaintiffs had raised in that it made the defendants agents of His Majesty and not of the plaintiffs and their powers had been restricted.

Electric Fences

SHORTAGE of timber and other materials needed for hedging is proving an obstacle to the ploughing-up of grassland, and attention has been drawn by the Ministry of Agriculture to the advantages of the live-wire fence. The system recommended as entirely safe employs a 6-V battery and "current controller," costing about £10, which charges intermittently (30 to 60 pulses per minute) a single strand of wire run on insulators supported by light posts. One installation can serve up to twenty miles. While in this country the area covered would generally not exceed seven acres, separate fencing systems can be electrically connected.

During a visit to the works of the Wolseley Sheep Shearing Machine Co., Ltd., which has facilities for the manufacture on a large-scale of equipment of this type, we were informed that sales were rapidly increasing. While conditions here may not be so favourable to its use on so extensive scale as in the United States, where more than 250,000 installations are said to be in use, we saw letters from users that testified to their successful application to a great number of purposes in various parts of Great Britain.

In addition to serving the more orthodox ends of penning pigs and sheep and keeping cattle and horses within bounds, the system has been adapted to such expedients as protecting cabbages from rabbits, stacks from fowls, poultry from foxes and even barns from the depredations of rats. "Rotational grazing," by dividing up large fields, provides another example of its possibilities.

The Wolseley fencer consists essentially of an electromagnet and a secondary voltage coil with make and break contacts shunted by a condenser and spring controlled by a balance wheel to give fifty interruptions per minute, each impulse lasting 0.001 sec. Two terminals are provided, one for dry or sandy soil and a second giving a slighter sting for normal soil. A lightning arrester is also included.

Effect upon Animals

The equipment in a chrome weatherproof case, with battery compartment, is clamped to a metal post driven far enough into the ground to provide a good earth return. The battery will normally require to be recharged not more often than once a month. While this is being done the fence can be left dead, since if the animals have been surprised as a result of touching it they will keep away from it. The wire (which should be barbed for sheep) is run at a height of about two-thirds that of the animals, and where these are of different sizes two wires may be necessary. An inexpensive gate can be provided by breaking the wire and looping it and inserting a hook with a strong spring and insulating handle. For testing the insulation of the fence a portable neon indicator is provided.

Importance is attached to training the stock by confining them within a small area in the first instance and putting food on the other side of the wire. Having found that the wire "stings" them the animals will quickly learn to avoid touching it and can be turned out into the field.

Another development of the Wolselev Co. that has recently gone into production is the "New Clipvac" shearing head, which is intended to be worked from the vacuum system of the milking machine, thus providing further work for the driving motor. The chief feature of this is that vibration and width of head have been considerably reduced by dispensing with the usual oppositely disposed pistons in favour of a pivoted rocking vane which automatically changes the vacuum from one side to the other.

Fencing controllers of British manufacture on similar principles to that described are also marketed by the Harvest Saver and Implement Co., Ltd., and the Cooper Stewart Engineering Co., Ltd. While the amount of energy used is small—not more than about 100 kWh per annum—the electric fence is a good "missionary" device for spreading the electrical idea among farmers. Further, it tends to give confidence in the safety of electricity, provided it is used in the proper manner, as then even deliberately induced shocks can be shown to be entirely devoid of risks. On the other hand, there have been sad experiences in America where amateur attempts have been made to use the mains supply for electrifying fences, necessitating the introduction of regulations to prohibit the practice and to specify the methods by which fences can safely be electrified.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

THE rapid strides which have been made in the electrical industry were commented on by various speakers on Monday in the Edinburgh Corporation Electricity Department showroms, when **Mr. E. Seddon,** city electrical engineer, who retires this week, received gifts from his staff. In making the presentation, Mr. J. Eccles, the new manager, said that Mr. Seddon had always striven to promote the highest interests of the enterprise under his control, and in so doing he had been wise enough to know that the success could be achieved only by the co-operation of those associated with him.

Mr. A. E. Marchant M.Sc.Tech., has been appointed deputy borough electrical engineer and manager of the Barking Corporation Electricity Department. He served a three-year apprenticeship with the Lancashire Dynamo & Motor Co., Ltd., Trafford Park, and in the following three years he took a degree course in electrical enginering at Manchester University, after which he completed a year's research work on high voltage insulators at the University. He then joined the Mid-Cheshire Electricity Supply Co., Ltd., Northwich, as assistant mains engineer, leaving there in 1932 to go to Warrington as technical assistant to the borough electrical engineer. He also took over the consumers' side of the undertaking about a year ago. Mr. Marchant is an associate member of the Institutions of Electrical and Mechanical Engineers.

Mr. A. E. Marchant

Mr. J. M. G. Rees, director of Oliver Pell Control, Ltd., & Tok Switches, Ltd., has been elected to the board of directors of Varley Dry Accumulators, Ltd.

Dr. R. W. Sorensen, professor of electrical engineering and head of the department of electrical engineering at the California Institute of Technology, Pasadena, whose nomination for the presidency of the American Institute of Electrical Engineers was recorded in our issue of March 8th, has now been elected, and took office on August 1st.

Mr. J. Bolton is retiring from the position of station superintendent at Burnley Corporation electricity works, and will be succeeded by **Mr. W. Blythe.**

Mr. A. L. Ward, senior technical assistant at Norwich, has been appointed meter superintendent to take charge of the South Shields Corporation meter department.

Mr. Justin R. Whiting, formerly general counsel of the Commonwealth & Southern Corporation, has been elected president of the Commonwealth & Southern Corporation of Delaware, president of the Commonwealth & Southern Corporation of New York, and chairman of the Consumers Power Co. He succeeds Mr. Wendell L. Willkie, who has resigned on being nominated as the Republican candidate in the United States Presidential election.

The *Electrical World* reports that **Dr. A. A. Potter,** of Purdue University, has been awarded the Lamme Medal for 1940 by the Society for the Promotion of Engineering Education.

Mr. Frank Pick, who earlier this year retired from the position of vice-chairman of the London Passenger Transport Board, has been appointed Director-General of the Ministry of Information. He has been engaged on special investigations for the Minister of Transport, but has been released from these duties to take up his new appointment.

Mr. H. A. O'Brien, a director of Modern Electric Power Products, Ltd., has joined the board of Robert Hornby & Co., Ltd.

Mr. W. A. T. Horler who, prior to being called up as a naval reservist on August 27th, 1939, was employed as Exide & Drydex battery storekeeper at the Chloride Electrical Storage Co.'s Bristol depôt, has been mentioned in dispatches (*London Gazette,* July 9th, 1940) for meritorious conduct in the manner in which he dealt with injured survivors picked up by the destroyer in which he was in charge of the sick bay.

Mr. L. E. Harvey, A.M.I.E.E., M.Inst.T., technical investigation officer, trams and trolley-buses, of the London Passenger Transport Board, retired on August 4th. Mr. Harvey joined John Mowlem & Co., and was engaged on the construction of the Waterloo and City and South London Railways. After a period with O'Gorman & Cozens Hardy and R. W. Blackwell & Co., he joined the Halifax Corporation Tramways in 1902 and was in charge of overhead construction. Two years later he went to Sunderland as resident engineer and deputy manager of the Corporation tramways. In 1908 he became general manager and engineer of the South Shields Corporation Tramways, and in 1912 took up a similar post at Ilford, where he remained until the formation of the L.P.T.B. in 1933, when he was appointed technical investigation officer (tramways) to the Board. He is a member of several committees of B.S.I.

Mr. H. S. May, superintendent of rolling stock, trams and trolley-buses, of the London Passenger Transport Board, who retired on August 1st, was meter and testing superintendent in the Blackpool Corporation Electricity Department. Later he assisted in the tramway change-over from conduit to the overhead trolley system, becoming resident engineer of the Corporation tramways in 1899. He joined the L.C.C. in 1908 as assistant rolling stock superintendent, and remained with the Council until the formation of the L.P.T.B.

Mr. J. Lunn has been appointed assistant works engineer (Charlton) of the L.P.T.B. He commenced his career as an outdoor supervisor for G. F. Milne, builders of electric tramcars. In 1904 he joined the West Ham Corporation Tramways, and prior to the Board's taking over was rolling stock engineer. He went to Charlton in 1936 as assistant works engineer at the main tram and trolley-bus works, and was appointed an officer of the Board on August 4th this year.

Mr. B. J. Smithin has been appointed engineering superintendent (trams and trolley-buses) of the L.P.T.B. After experience with J. F. Pease & Co., Heenan & Froude, Ltd., the Brush Electrical Engineering Co., Ltd., and Mountain & Gibson, Ltd., he entered the Tramways Department of the L.C.C. as draughtsman at the Charlton works in 1910, being transferred two years later to the head office as a technical assistant in the rolling stock section. He joined the L.P.T.B. on its formation as an assistant on the technical staff of the chief engineer (trams and trolley-buses).

Mr. R. Birt, borough electrical engineer of Ealing, who is already a barrister-at-law as well as a member of the three leading engineering institutions, has recently passed the final examination of the Chartered Institute of Secretaries.

Obituary

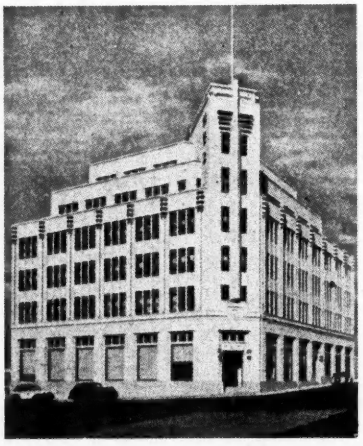
Mr. W. H. Grimsdale.—The death took place on August 6th, at Weaverham, Cheshire, of Mr. William Henry Grimsdale, a partner in the firm of Preece, Cardew & Rider. In the early days Mr. Grimsdale was with Sir Arthur Preece in Victoria Street, S.W.1, before becoming electrical engineer to the Warrington Corporation in 1898. In 1903 he returned to the firm of Preece & Cardew, as it was then, and became a partner in 1924.

Mr. Alfred Shepherd, whose death has occurred at Edinburgh at the age of eighty-three years, was a director of the Lancashire Electric Power Co. and of other concerns.

Tasmanian Commission's New Headquarters

COMMENCED in November, 1938, the new administrative building of the Hydro-electric Commission of Tasmania has recently been completed. The architectural features of the building are brought out at night by 15 mm. fluorescent tubing, of which altogether 2,540 ft. is used for exterior illumination, including eight parallel runs of lemon-yellow tubing down the front of the tower. Special attention has also been paid to interior lighting, which provides a total load of 67 kW.

An interesting part of the building's equipment is the heating and ventilating installation. A 54-in. multivane fan in the roof draws air through a water-spray chamber and strip heaters, the washed, humidified and warmed air being passed down a vertical shaft and distributed through ducts. There are two batteries of finned strip heaters, one of 106 kW in the air stream before the water spray, and the other (240 kW) for raising the temperature of the air from 55 to 65 deg. F., with a relative humidity of about 60 per cent. Additional heating is provided by low-temperature thermostatically controlled ceiling panels. The total installed load in the building is 751 kW.



New headquarters of the Tasmanian Hydro-electric Commission

The supply is by duplicate 0.5 in. cables at 415 V, three-phase. From the main switchboard in the basement sub-mains run to distribution boards on all floors. The sub-mains are protected by h.r.c. fuses and the sub-circuits by miniature circuit-breakers.

Electric Furnaces in the U.S.A.

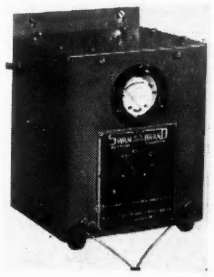
Electric furnace steelmaking capacity in America is undergoing a considerable expansion to provide armour plate for tanks, special quality steels for aeroplanes, &c., states *Iron Age.* In addition to whatever new plant may be installed at the Naval Ordnance Works at Charleston, W. Va., at least three steel companies are putting in large electric furnaces for making alloy steel for various defence requirements. It is estimated that by the autumn the electric furnace capacity of the country will have been enlarged by at least 300,000 tons a year.—*Reuter's Trade Service.*

NEW ELECTRICAL PRODUCTS

A Review of Equipment Recently Marketed

Battery Charger

THE inexpensive motor-car battery charger announced as the No. 596 "Swan-Brand" by BULPITT & SONS, LTD., Swansea Works, Birmingham, 1, is supplied complete with two-way non-reversible plug and flexible connectors.



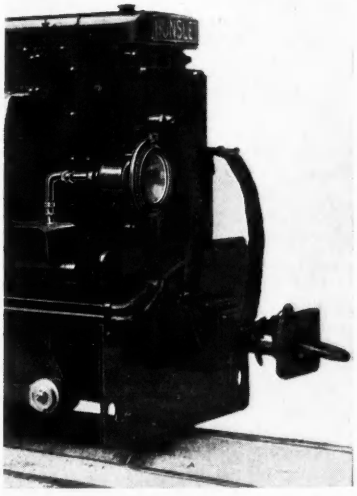
Home garage battery charger

It is of a portable size, but provision is made for screwing it firmly to the wall. The rectangular sheet-steel casing houses a double-wound 200/250 V step-down transformer which delivers its output through a selenium metal rectifier. A rotary tapping switch provides for current adjustment for charging 2-, 6- and 12-V batteries at 1A through a recessed ammeter, the needle pointer of which will swing over to the red section of the dial marked "Caution" in the event of the output leads becoming accidentally reversed. Provision is made for earthing the metal case.

Flameproof Lighting for Locomotives

To enable Diesel locomotives to be used safely where inflammable or explosive gases are present, their electric lighting fittings must be flameproof, like those designed by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, for use on Diesel mine locomotives. They have been approved by the Buxton testing station of the Mines Department (Groups I and II), and have also the approval of the Air Ministry and the Home Office for use in gassy mines, petrol-laden atmosphere, shell-filling factories and similar situations where it is necessary to take precautions against possible explosions

The headlight throws a powerful beam over a distance of several hundred yards, which is desirable for speeds up to 15 MPH. It is the first fitting of its type and size to be placed on the market for this purpose, the body and terminal box being iron castings together with a reflector of chromium-plated copper. Armour-plate front glass is provided, and provision is made for a diffusing or spreading glass to be fitted. The body of the fitting incorporates a flange for fixing to the frame of the locomotive, and a separate terminal chamber is tapped for either heavy-gauge conduit or a special sealing-box for armoured cable. The lampholder is suitable for an "Osram" automobile bulb of 60- or 36-W rating.

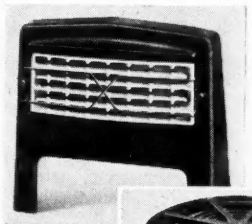


Flameproof headlamp on 25-HP "Hunslet" Diesel mine locomotive

The G.E.C. flameproof cab-light also has a body and terminal box of cast iron, together with a heavy well glass to protect the lamp. Lugs are provided for ceiling fixing, and two conduit entries allow for through wiring; the lampholder takes a 15-W "Osram Pygmy" type sign lamp.

Domestic Electrical Appliances

New season's domestic appliances listed by CARRON COMPANY, Carron, Falkirk, include the inexpensive "Carrovic" fire of 1 kW loading. Though strongly made of cast-iron, it is a lightweight model of 7.25 lb., 10.25 in. high, 12.25 in. wide and 4 in. deep. A cool wire handle is fitted, and the lacquer finish is applied in two shades.



Cast-iron "Carrovic" fire

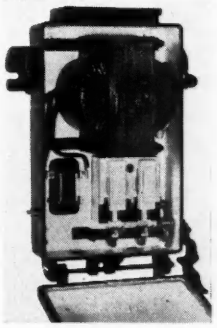
Open type boiling ring

An attractive open type boiling ring is made of cast-iron and insulated throughout by steatite components. A drip-shield is fitted and a three-core flexible connector with cord grip. The loading is 1 kW and the overall dimensions are 9.25 in. (diameter) and 4 in. (height). Standard finishes are duo-tone lacquer or mottled vitreous enamel, with dull nickel plated top.

Low-voltage Lighting

For lighting under A.R.P. conditions the BRITISH ELECTRIC TRANSFORMER CO., LTD., of Hayes, Middlesex, in association with Crompton Parkinson, Ltd., offers a voltage reducing switchbox that is manufactured to comply with the requirements of BSS/794 for indoor use in a fixed location and for shelter lighting as stipulated in BS/ARP6 and BS/ARP26 when used with such other apparatus as is therein mentioned.

It consists of a double-wound air-cooled transformer, a double-pole input switch, double-pole rewirable input fuses and single-pole cartridge fuse on the output side, with one spare; double-pole fuses and two spare cartridges are fitted where the output voltage is 25 or greater. The housing is a two-part cast-iron case with hinged front, the switch handle being interlocked with the lid in such a manner as to prevent the opening of the case while the switch is in the "on" position.



Low-voltage lighting apparatus

Input conduit entry is at the bottom; ¾ in. conduit exits for the low-voltage leads are provided at both the top and bottom of the case, a screwed plug being inserted in the exit not actually used, and the case can be drilled at the top to take a suitable light fitting bracket. Two-pin and scraping earth plugs and sockets can be fitted on top or on the side of case, which will accommodate transformers of 50, 75, 100, 150 or 250 VA, and it is possible, under certain conditions, to design suitable transformers up to 500 VA. The recommended secondary voltage should be 12, 25, 32 or 50-V at half-load unity power factor at 15 deg. C., but the transformers can be designed for any other appropriate secondary voltage.

In accordance with BS/ARP6, the output for lighting purposes is 150 VA at 12 V. If required, tappings can be provided on this size for the purpose of battery charging in connection with a separate rectifier.

Switch and Switch-plug

A sample of a neatly-made pressel switch recently marketed by REEVES AND CO. (BIRMINGHAM), LTD., Crescent Works, Birmingham, 1, shows it to be substantially constructed and of small dimensions, both the push-rod and screwed ring being coloured white.

A three-pin 15-A switch-plug is a useful addition to the range of "Junior" models. In most respects it is similar to the quick-make and quick-break 2-A pattern, on a vitreous china base with recessed back and knockouts for surface wiring. The moulded shockproof cover and plug are both of rectangular shape and, like the smaller pattern, this new 15-A switch-plug is supplied in brown finish only.

I.O.M. Board's Report

OPERATIONS of the Isle of Man Electricity Board were interfered with last winter by severe storm damage, and portions of two lines have subsequently been undergoing reconstruction at an estimated cost of £1,100. Various works have been undertaken to localise breakdowns, and in addition the whole of the high-voltage system will eventually be divided into one-mile lengths, each self-supporting.

Last year total supplies by the Board, of which the engineer and secretary is Mr. V. A. F. Bellamy, amounted to 3.8 million kWh (including 0.8 million kWh to the Manx Electric Railway), an increase of 11.1 per cent., and 351 additional consumers were connected, making altogether 4,194. Excluding bulk supply and public lighting, the kWh sold averaged 702 per consumer, against 639 in the previous year.

The average price obtained fell from 2.33d. to 2.18d. On the other hand, working costs rose from 1.452d. to 1.503d. In this connection the report points out that the bulk supply charges of Douglas Corporation have increased from £5 17s. 5d. (kW charge) and 0.298d. (unit charge) in 1935-36 to £6 14s. and 0.43d., estimated, for 1939-40, or by 10.6 per cent. and 40.5 per cent., respectively. The Board has now applied to the Courts for a declaration as to its liability to the Corporation under the existing Act.

The Board's income for the year was £35,422 (against £33,015), and working expenses were £23,063 (£20,606), there being a net deficit of £545 against a profit of £1,925 in 1938-39. It is noted that continuous meter readings were started in 1938-39 and a sum of £3,983 was then included to cover unread consumption. In the year under review the revenue is based on actual readings only, and it is estimated that unread sales represent a deferred income of £4,500 and a profit of £730.

COMMERCIAL and INDUSTRIAL NEWS

Limitation of Supplies. New Aluminium Order. Fan Export Group

Limitation of Supplies

COPIES of the Home Trade Register, compiled by the Board of Trade under the Limitation of Supplies Order, are now available from the Stationery Office (2s. 6d. net), but sectional lists at a lower price are to be issued shortly, and it is recommended that those who are interested in the matter should wait for them. The Register contains the names of about 20,000 firms and individuals, many of whom are registered in several classes.

The director of the Electrical Wholesalers' Federation (Mr. A. Albrecht) informs us that he has obtained a ruling upon the electrical goods included in the Limitation of Supplies Order. The goods covered are as follows:—*Class 9.*—Hair clippers (domestic and animal); milk heaters (sterilisers or porringers); coffee percolators; saucepans; shaving pots; steamers (domestic types), and teapots. *Class 17.*—Chafing dishes; irons; toasters (domestic); warming plates; hair dryers; kettles; vacuum cleaners; dish washers, and washing machines. Further information is being sought regarding the following to discover whether they are to be considered as controlled goods:—Health exercisers; drink mixers; domestic mixers; vibrators; warming bottles; egg boilers and grill boilers.

R.A.F. Window Display

Official support has been given to a movement to use shop windows as a medium for national publicity. There have already been posters and Press advertising for such campaigns as National Savings, Food and Air-raid Precautions. During the past six weeks or so over the whole country the shop window has been brought into use for a similar purpose. Originally the idea was mainly to use the windows of large stores in busy shopping thoroughfares. So successful has the scheme been, however, that the number of windows in use for this purpose has been multiplied by four in a few weeks, and to-day approximately 1,000 are included in the scheme. Briefly, once a fortnight a theme, on which the display is based, is selected and passed on to the participants in the scheme by the Ministry of Information, together with a certain amount of material, usually photographic enlargements, as a basis for the display. So far there have been three displays, the themes for which have been "Hold Fast and We Win!", "The Royal Navy" and "The Royal Air Force." The last display, an example of which is at present installed in one of the windows of the General Electric Co., Ltd., at Magnet House, Kingsway, W.C.2, is shown in the accompanying picture.

An R.A.F. display in one of the G.E.C. windows at Magnet House, Kingsway, London, W.C.2

Aluminium Control

The control of aluminium has been transferred from the Minister of Supply to the Minister of Aircraft Production, who has made the Control of Aluminium (No. 5) Order, 1940 (No. 1449), which came into force on August 14th.

The new Order repeats the main provisions of the existing Order, subject to certain modifications. In particular a licence is required for the treatment, use or consumption of aluminium scrap and aluminium alloy scrap except for the purpose of converting it into ingots. It should be noted that the grinding of foil scrap to produce powder and the "destructive" use of scrap for such purposes as steel de-oxidation or the manufacture of aluminium bronze are now subject to licence. The cleaning, crushing, bulking and sorting of scrap in the course of collection and merchanting continue to be exempt from licence. All acquisitions of aluminium and aluminium alloy and all disposals of aluminium and of aluminium alloy must be effected under licence. Licences will not be granted to anybody to acquire or dispose of aluminium or aluminium alloy simply for the purpose of dealing in it. Further information may be obtained from the Aluminium Control, Southam Road, Banbury.

In addition, the Ministry of Aircraft Production will be responsible for bauxite, cryolite and silicon metal to which Ministry matters regarding this material should be addressed. The Control of Silicon (No. 1) Order, 1940, No. 1,452, which came into force on August 14th, provides that silicon metal (i.e., material containing not less than 97 per cent. of silicon) shall not be bought, sold or used except under licence.

Radiologists' Association

The Faculty of Radiologists ("Limited" omitted from title by licence of the Board of Trade) was registered on July 27th as a company limited by guarantee, without share capital. The original number of members is 1,000, each member being liable for £1 in the event of winding up. The objects are to encourage the study and improve the practice of radiology, &c., and to take over all or part of the property of the unincorporated association known as the "Faculty of Radiologists." The registered office it at 32, Welbeck Street, London, W.1.

Merseyside Reconstruction Panel

A Reconstruction Panel has been set up on Merseyside to provide means of repairing damage which may be done by enemy air raids to aircraft, munition and other essential war production factories. The scheme, which was originally planned by the Minister of Aircraft Production, has been extended to include the Ministry of Supply and the Admiralty, and is under the auspices of the Area Board for the North-Western Region. The chairman of the Merseyside Panel is Mr. W. S. Roberts, of the Railway Signal Co., Ltd., and the members include Mr. T. A. Eades, of the Automatic Telephone Co., Ltd., and Mr. W. Travis, of British Insulated Cables, Ltd. The hon. secretary is Mr. J. S. Hassel, secretary of the Engineering and Allied Employers' Liverpool Association.

Australian Tariff Proposals

The Department of Overseas Trade has been informed by H.M. Senior Trade Commissioner in Australia that at a meeting on September 17th the Tariff By-Law Advisory Committee will consider requests for the removal of the undermentioned goods from by-laws prescribing their admission into Australia under the tariff items specified: A. Tariff Item 404.—Motors, electric, split-phase, ¼ HP, under security, for use in the manufacture of household-type electric clothes-washing machines. In the event of the goods being removed from the by-law they would be classified under Tariff Item 179 (D) (1) (a) (1) (a), for which the British preferential tariff is 30 per cent., the intermediate tariff 50 per cent., and the general tariff 65 per cent. B. Tariff Item 404.—Condensers, variable, under security, for use in the manufacture of wireless transmitters. In the event of the goods being removed from the by-law they would be classified under Tariff Item 180 (L) (2), for which the British preferential tariff is 30 per cent., the intermediate tariff 50 per cent., and the general tariff 57½ per cent.

Fan Export Group

The Fans and Ancillary Equipment Export Group has been formed and duly recognised by the Export Council. The manufactures included in this group are covered by the general classification of "all plant in connection with the movement of air by fans." They, therefore, include fans, air heating, cooling and conditioning plants, air ventilation plants, dust collection and air filtration installations, &c. The Executive Committee consists of the following seven members: Messrs. W. A. Davidson (chairman, Davidson & Co., Ltd.); G. L. Copping (Blackman Export Co., Ltd.); H. Merrin (Matthews & Yates, Ltd.); A. J. Assheton (C. A. Dunham & Co., Ltd.); J. MacVicar (Thermotank, Ltd.); E. L. Joseph (Ozonair, Ltd.); and M. G. Woods (M. W. Woods, Ltd.). All firms concerned in the manufactures covered by the classification given above should join this Group without delay in order to ensure their supplies of raw material, timber for packing, &c. The Group has already received allocations of steel, timber, &c., which it is in process of allotting to its member firms. Apart from bringing trading opportunities to the notice of its members the Group is prepared to give its advice as to finance, provision of credit facilities, contract conditions and similar matters. The secretary is Mr. A. G. Marshall, 2, Howard Street, Strand, London, W.C.2 (telephone: Temple Bar 1314), from whom full particulars can be obtained.

Supply Authorities' Machine Tools

All electricity undertakings have been asked to furnish particulars of the types of machine tools installed in their repair shops and of the usage of these, giving details of the amount of labour available to man the machines for possible work on munitions at night or at week-ends, or the amount of labour which would be required from outside sources if machines are available.

Vehicle Battery Order

The Chloride Electrical Storage Co., Ltd., has received an order from Hovis, Ltd. (who are big users of battery operated electric vehicles for the distribution of bread) for 76 Exide-Ironclad batteries for use in new Morrison electric vehicles, and 36 Exide-Ironclad batteries, being renewals of old batteries in existing vehicles.

Tin Statistics for June

World production of tin during June is estimated at 19,600 tons, against 17,500 tons in May. The total production in the first half of 1940 was approximately 102,900 tons, compared with 63,200 tons in the first half of 1939.

Tin consumption in the United Kingdom totalled 15,740 tons in the first six months of 1940, against 10,341 tons in the corresponding period of 1939, showing an increase of more than 52 per cent. United States deliveries increased by 68½ per cent. from 30,000 tons in the first half of 1939 to 50,609 tons in the first half of the current year. World stocks of tin, including smelters' stocks and carry-over, were 41,211 tons at the end of June, 1940, compared with 40,783 tons a month before and with 39,368 tons at the end of June, 1939.

At the meeting of the International Tin Committee held on July 8th the quota of tin production for the third quarter of 1940 was revised from 100 per cent. to 130 per cent. of the standard tonnages, and this revised rate will remain in force for one year from July 1st, 1940. The higher rate of production provides for the accumulation of a reserve stock of 75,000 tons of tin in the United States.

Rubber Producing Companies

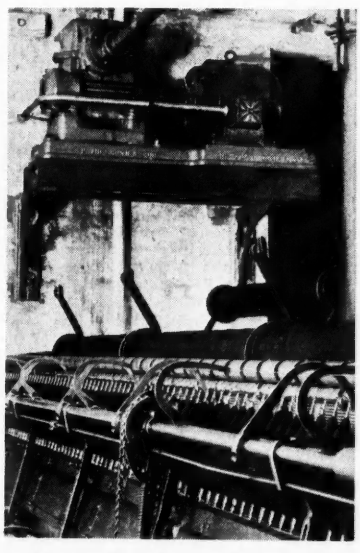
The contents of the 1940 manual, "Rubber Producing Companies," cover a wide area. They include companies interested in tea, coffee, coconuts and palm oil, as well as rubber.

Other details embrace forward sales, capitalisation per planted acre, investments and reserves. A valuable feature is the analyses of results of the past few years. These show estate areas (budded and other), standard outputs, annual production, gross price, "all-in" cost (where possible), net profit, dividend and carry-forward. The dates of the last reports and annual meetings are also given.

The work contains particulars of about 550 undertakings, and is obtainable from the *Financial Times*, 72, Coleman Street, E.C.2, and the Mincing Lane Tea & Rubber Share Brokers' Association, Plantation House, E.C.3, at 7s. 6d. net, or 8s. 1d. post free (abroad 8s. 1½d.).

Textile Mill Conversion

The accompanying illustration shows the looms in a textile mill which has recently been converted to electric drive. This mill was originally driven by a 350-HP steam engine and has been replaced by 280 HP of Brook electric motors,



Brook motors for driving the looms at a textile mill

mainly used in conjunction with David Brown & Sons gears. Nine of these geared motor units eliminate several hundred feet of line shafting and remove twenty-six bevel wheels, thus saving 80 HP of friction load which was previously present when driven by the engine.

Railway Directory

The widespread attention that is being given at the present time to the maintenance and expansion of British export trade makes particularly important the information contained in the "Universal Directory of Railway Officials and Railway Year Book, 1940-41." (The Directory Publishing Co., Ltd., 33, Tothill Street, Westminster, S.W.1. Price 20s. net.) It enables railway officers and others to keep in touch with the personnel of railways throughout the world for the exchange of information concerning research and developments in all phases of railway operation and maintenance. There are three indices, viz., an index to countries; a general index, including all references to railways and statistical and other information; and a personal index of railway officials. Within the limitations imposed by war conditions, the lists of railway officers have been revised, and the brief descriptions of the chief railway systems of the world with the latest available financial results include the most recent changes of which information is obtainable.

Savoy Chapel Lighting Installation

The King's Chapel of the Savoy, Strand, London, W.C.2, which is all that remains of the Palace and Hospital of the Savoy, is the personal property of the King by right of his Duchy of Lancaster, of which the Savoy became the centre in 1351. His Majesty, at the time of the Coronation, placed the Chapel at the disposal of the Royal Victorian Order, to be regarded as the Chapel of the Order. Recent additions made have launched it on a new era of importance, and it can now be used for the first time for ceremonial processions.

The Chapel stands low and was approached by a narrow flight of steps. Its new approach consists of a stone parapet with broad sideways flights of steps which make robed processions possible. A robing room and a new cloister are other additions to the ancient building. In the Chapel itself space-saving ideas have been carried out to make more room. The Royal stalls have been designed as part of the new wall panelling where the old organ stood. A miniature electric organ, similar to the one in Canterbury Cathedral, has been installed. The beautiful ceiling of eighty-eight wooden panels has been cleaned and retouched to a parchment shade, and can now be seen to full advantage owing to the concealed lighting from the sills of the windows, which lights the whole of the interior of the Chapel, and in peacetime allows the stained glass to be seen from outside by transmitted light. The whole of the design of the lighting installation was carried out by G.V.D. Illuminators, Ltd.

The King's Chapel of the Savoy, Strand, the lighting installation for which was carried out by G.V.D. Illuminators, Ltd.

B.S. Specifications

New and revised British Standard Specifications have been issued as follows: — No. 905, Anti-Interference Characteristics and Performance of Radio Receiving Equipment (excluding motor vehicles and marine purposes); No. 613 (revision), Components for Radio Interference (excluding traction and marine); No. 908, Sisal Ropes for General Purposes; No. 431 (emergency revision), Manila Ropes for General Purposes; No. 904, Dimensions of Instrument Jewels (excluding integrating meters and clocks). Copies of any of the above specifications may be obtained at 2s. 3d. post free from the British Standards Institution. There is also a new publication in the BS/ARP series, No. 31 (8d.), which deals with Ventilation for Buildings in Conditions of Black-out.

Trade Announcements

Tricity Cookers, Ltd., has removed to 44, Studland Road, Hanwell, London, W.7 (telephone: Waxlow 1284).

Until further notice all communications for the radio, lamp, Thermovent, moulding and export sales, and publicity, accounts and secretarial departments of E. K. Cole, Ltd., should be sent to Green Park Hotel, Aston Clinton, Bucks (telephone Aston Clinton 3126). Correspondence for the service department, other than that dealt with at the depôts, should be sent to Southend-on-Sea as previously. All goods returned for service or credit, where sanctioned, should also be consigned to Ekco Works, Southend-on-Sea, or to the provincial depôts as hitherto.

Dissolution of Partnership

Mr. A. V. Casemore and Mr. A. Fisher, carrying on business as electrical engineers at 143, Harcourt Street, Reddish, Stockport, and at 19, Penarth Road, Northenden, Manchester, under the style of A. Casemore & Co., have dissolved partnership. Mr. Casemore will attend to debts at 143, Harcourt Street, Reddish, Stockport.

Spray Painting Equipment

A new 32-page illustrated catalogue, printed in two colours throughout, is the third major B.E.N. publication to be issued within the last two months. It covers the complete range of spray painting plant and equipment, dealing in detail with portable and stationary types and all small fittings and accessories. It is obtainable on application to B.E.N. Patents, Ltd., Hughenden Avenue, High Wycombe, Bucks.

Prices of Materials

The only change in the prices of materials which has taken place since July 31st is as follows:—

Henry Gardner and Co., Ltd., report August 14th: English block tin £263, £5 10s. decrease.

New Catalogues and Lists

Bio Electrics, Ltd., 18, Gibson Street, Glasgow.—A leaflet relating to a new range of soldering irons.

Murex Welding Processes, Ltd., Waltham Cross, Herts.—Leaflet No. M17, describing the fabrication of machine tools by electric arc welding.

Lincoln Electric Co., Ltd., Welwyn Garden City, Herts.—An illustrated leaflet relating to "Fleetweld" electrodes.

Trade Mark Applications

AMONG recent applications for British trade marks are the following, objections against any of which may be entered within one month from August 7th.

Chema. No. 611385. Class 11 (IV). Ventilating and air filtration installations, &c., Chema Manufacturing Co., Ltd., Bush House, Aldwych, W.C.2.

Marigold (lettering and design), No. 612126. Class 14 (IV). Watches and clocks. Electric Clock Service, Ltd., 117, Merton Road, London, S.W.19.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

ROSAMON hospital type steriliser.

KLINOSTIK ophthalmoscope.

VIGILANT automatic charging switch.

Electronaire Marketing Co., Ltd. (present address).

ELECTRICITY SUPPLY

More Modified Lighting Schemes. Sheffield Charges. Position in Thanet

Adwick-le-Street (Yorks). — CHEAPER ELECTRICITY.—A reduction costing the Council some £1,000 a year has been made in the electricity charges. It is anticipated that there will still be a profit on the undertaking and that the reduction will result in more consumers being obtained.

Bangor. — ELECTRICITY CHARGES.—Mr. Price F. White, consultant to the Electricity Committee, recently reported that he anticipated a considerable saving in working costs during the current year and a reduction in bulk supply charges, against which it was estimated that there would be a fall in revenue due to lighting restrictions and alterations to summer-time hours. He suggested that consideration of electricity charges should be deferred until a later meeting. It would be an advantage to have the views of his successor, Mr. Harber, on any proposals involving a change in tariffs.

Basingstoke.—SUPPLY EXTENSION.—The Town Council has decided to proceed with the extension of the electricity supply to Bramley.

Blackburn.—JOINT METER READINGS.—At a recent meeting of the Town Council, Councillor R. F. Mottershead asked for an assurance that the resolution passed by the Council in April would be implemented so far as it referred to joint meter readings and rentals. The scheme could then be put into operation by the September quarter as intended, he said. The town clerk said he would do his best to remove the difficulties, but it was improbable that the scheme would be brought in for the September quarter.

Blackpool. — BULK SUPPLY ARRANGEMENTS.—It was reported to the Town Council last week that to save further overloading of the main cables Thorton Cleveleys would obtain a supplementary supply from Fleetwood.

Bromley. — DEPARTMENT'S PROFIT. — At last week's meeting of the Town Council it was stated that there was a profit on the past year's working of the Electricity Department of £6,374, although the output showed a fall of 2.5 per cent.

Chesterfield.—GARAGE HEATING.—In connection with the heating of the Thornfield garage, estimated to cost £1,132, the Transport Committee has considered an alternative scheme for the installation of electric heaters in the radiators of the omnibuses. The electrical engineer, however, reports that such a system would be unsuitable.

The Cleansing Committee has arranged for the Electricity Department to provide electric heating at the refuse-collection vehicle garage.

Eastbourne. — PRICE INCREASE POSTPONED.—A proposed increase in charges recommended by the Electricity Committee has been disapproved by the Town Council, which has decided to defer consideration of the matter for six months.

Halifax.—DOMESTIC APPARATUS.—At a recent meeting of the Town Council it was reported that the Sales Sub-Committee had submitted to the Light, Heat and Power Committee a resolution that the Gas and Electricity Departments should be permitted to install gas and electrical appliances in consumers' premises on simple hire or hire-purchase terms, and that the conditions should be uniform for both Departments. The full Committee approved, except for the proviso that the conditions should be uniform for both Departments.

Hove.—MINIMUM CHARGE.—In view of the fact that many houses are being shut up but the furniture is not removed, no notice is given to disconnect the supply, and meters still have to be read, the Electricity Committee proposes to institute a minimum charge of 5s. per quarter.

Huddersfield.—MODIFIED LIGHTING.—The necessary fittings are to be installed for a limited system of emergency street lighting during the winter.

London.—WANDSWORTH.—By a majority of two votes the Council last week decided in favour of the provision of modified lighting as from October 1st.

Motherwell.—HOSPITAL HEATING.—In connection with the provision of sterilising and heating plant at the maternity hospital, a 30-kW steam-raising electrode boiler is to be installed at an estimated cost of £130.

Northallerton (Yorks).—STREET LIGHTING.—The Urban District Council is to submit a scheme of modified street lighting to the Ministry of Home Security.

Nuneaton.—HIGHER CHARGES.—It is proposed to reduce the discount for heating supplies from 20 to 5 per cent., and to discontinue the 10 per cent. discount for lighting. In the case of all other consumers, except those supplied under special agreements, and where there is a coal clause, it was recommended that there should be an increase of 15 per cent. in the standing and/or "unit" charges, but this was referred back for further consideration. Councillor Lee said that shopkeepers would in many cases be paying a greater increase than other consumers owing to the high assessments.

Oxford.—RISING COSTS PROBLEM.—At a recent meeting of the City Council the Deputy-Mayor stated that it was not proposed to increase the price of electricity at present. The running of the undertaking, however, was becoming more and more difficult with the rising price of coal and the increased assessment on the undertaking—it had gone up by £10,000.

Perth. — PRICE ADVANCE. — A recommendation to the Town Council involves an increase of ¼d. in electric heating and lighting charges, and 10 per cent. in the power rate. The present flat rate for lighting is 2¾d. per kWh.

Scarborough.—CHARGE FOR A.R.P. SUPPLIES.—It has been decided that the charge for electricity for A.R.P. purposes in the borough shall be in accordance with the rate at present fixed for contracts for large mixed supplies of electricity irrespective of the condition relating to a guaranteed minimum consumption.

Sheffield.—PRICE INCREASE AGAIN DEFERRED.—The much-discussed question of increasing electricity charges by 10 per cent. to all consumers except those whose contracts embody a coal clause was last week deferred by the City Council until the November meeting. Councillor F. Lloyd said that the report of the electricity undertaking disclosed a very strong financial position. It was no time to increase charges when the undertaking had made over half a million profit. Councillor E. S. Graham pointed out that the Electricity Department was charging the Transport Department just under ¾d. per kWh and a large consumer just over ¼d. per kWh. Surely the Transport Department must by now have paid off any expenditure to which it had put the Electricity Department in the matter of transformers and other equipment? Councillor J. Whittington, chairman of the Electricity Committee, said the number of kWh sold to the Transport Department in the year ended March last was 40,648,520 and the price was 0.720d. per kWh. The lowest price charged to any big works consumer was 0.3d. per kWh.

Sleaford.—SUPPLY TO AIR-RAID SHELTERS.—A charge of £2 has been fixed by the Electricity Committee for supplies to each public air-raid shelter.

Stoke-on-Trent.—LOAN FOR COOKERS.—The Electricity Committee is seeking sanction to borrow £2,000 for cookers.

Stretford. — STREET LIGHTING. — The Lighting Committee has now approved a modified lighting scheme at a cost of £1,700.

Surrey.—ELECTRIC FANS.—The County Council is to install electric fans at Guildford Hospital at a cost of £70.

Tenterden. — MAINTENANCE OF STREET LAMPS.—The Town Council has agreed to pay the Weald Electricity Supply Co., Ltd., a nominal sum of 11s. per annum for each lamp and 8s. per annum for each bracket for the duration of lighting restrictions, reducing the annual payment from £147 to £49.

Thanet.—PRICE INCREASE.—A proposal by the Isle of Thanet Electricity Supply Co., Ltd., to increase its charges by 33⅓ per cent. has been agreed to by the Margate and Broadstairs Joint Advisory Committee "provided that the Electricity Commissioners consider it is reasonable that the increased charges should be met by the few remaining consumers, who are already seriously affected by the complete loss of trade in the district, and not by some form of national relief." A stipulation is made that the increases shall only apply for the duration of hostilities.

Wakefield.—EMERGENCY LIGHTING INSTALLATION.—The Health Committee is obtaining quotations for an emergency lighting installation at the hospital.

Use of Unarmoured Cables

A MEMORANDUM of the Electricity Commissioners dated August 12th makes it clear that steel for armouring should be used only in the following cases:—Pilot, telephone or control cables laid direct in the ground in connection with important transmission schemes; power cables near railway tracks, road bridges or other situations where vibration is great; power, control and communication cables installed where subsidence is possible, where gradients are severe or where the cables are exposed to damage above ground; cables for submarine use and river crossings. Wire armouring should be used in preference to tape.

Lead sheathing on unarmoured cables (where armoured cables would normally have been used) should consist of one of the lead alloys included in B.S.S. No. 801; the particular alloy should be left to the option of the cable manufacturer. Sheath dimensions should be in accordance with B.S.S. No. 480.

Waterproof covering over the sheath should have a nominal radial thickness of 0.1 in. It should consist of two pre-impregnated paper tapes, the outer tape applied centrally over the edges of the inner, followed by one layer of pre-impregnated cotton tape and one of pre-impregnated hessian tape, together with waterproofing compound. Alternatively, the two paper tapes may be followed either by two compounded hessian tapes or by compounded jute servings.

TRANSPORT

Birkenhead. — VISIBILITY OF TRAFFIC LIGHTS.—Mr. E. F. Spencer, the borough electrical engineer, and his staff have devised a scheme for overcoming the difficulty experienced by motorists of seeing traffic signals during the daytime following the masking of the lights. It provides for the introduction of a time switch at each junction, controlled by the signals, so that during the day the full green light is shown as before the war. The operation of the switch brings into use the black-out cross. It is not considered necessary to apply the device to the amber and red lights, as these can be plainly seen by motorists.

Cardiff. — TROLLEY-BUS CONTRACT.—It was reported to the Transport Committee on Monday that alternative arrangements had been made for the supply of ten trolley-buses. The original order for the chassis was placed with a Lancashire concern which had since been taken over by the Government, but delivery had now been guaranteed by London manufacturers within 21 weeks. In reply to a question whether the conversion was desirable in wartime, it was pointed out that the scheme had the full approval of the Ministry of Supply, which would receive several tons of scrap rails and poles. The present conversion was limited to deliveries that could be guaranteed by manufacturers, and it would probably be more economical to purchase buses now than later.

Salford.—ELECTRICITY v. OIL.—In his annual report, Mr. L. Romero, city electrical engineer, remarking that the war has put an end for the time being to the replacement of electric tramways by oil-driven buses, comments that, quite apart from the heavy drain which the latter make on the nation's shipping and foreign exchange resources in wartime, it is clear also that the public will have

(*Continued on next page.*)

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1938.

29119. "Regenerative braking on electrically driven vehicles." A. W. Maley and E. M. Taunton. October 7th, 1938. (523592.)

29310. "Electrical discharge system and method of operating the same." Board of Trustees of Leland Stanford Junior University. October 11th, 1937. (523712.)

32151. "Remotely indicating compasses." P. Kollsman. November 5th, 1938. (523595.)

32557. "Electric switches such as used for controlling electric motors." Igranic Electric Co., Ltd., and S. R. Wright. November 9th, 1938. (523533.)

32559. "Reflectors for road lighting." L. W. Meyer. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken.) November 9th, 1938. (Convention date not granted.) (523534.)

35480. "Straight-bar knitting machines which are electrically driven." G. Blackburn & Sons, Ltd., H. W. Start, and E. Start. December 6th, 1938. (523596.)

35525/35526. "Supporting means for fluorescent screens for X-ray and like purposes." General Electric Co., Ltd., and J. T. Caldwell. December 6th, 1938. (523472/523473.)

35985. "Protection of electric systems." British Thomson - Houston Co., Ltd. December 9th, 1937. (523603.)

36097. "Reversal of ships driven with electric machines." Brown, Boveri & Cie Akt.-Ges. March 10th, 1938. (523666.)

1939.

67. "Arrangements for producing oscillations of a sawtooth wave form." Marconi's Wireless Telegraph Co., Ltd. December 31st, 1937. (523476.)

153. "Incandescent electric lamps." Soc. Anon. pour les Applications de l'Electricite et des Gaz Rares Etablissements Claude-Paz Silva. June 27th, 1938. (523538.)

158. "Electric indicating and positional control systems." Sperry Gyroscope Co., Inc. January 3rd, 1938. (523539.)

172. "Thermionic valves." Standard Telephones & Cables, Ltd., and F. D. Goodchild. January 3rd, 1939. (523542.)

173. "Public address systems." Standard Telephones & Cables, Ltd., S. S. Hill, and L. J. Outram. January 3rd, 1939. (523543.)

419. "Electric condensers." Marconi's Wireless Telegraph Co., Ltd. January 5th, 1938. (523564.)

441. "Telephone systems." Automatic Telephone & Electric Co., Ltd. January 6th, 1938. (523569.)

448. "Electric clock." J. Nardin. January 5th, 1939. (523570.)

517. "Thermionic valves." Standard Telephones & Cables, Ltd., and W. T. Gibson. January 6th, 1939. (523574.)

519. "Methods of generating pulses characteristic of sound and like waves." Kolster-Brandes, Ltd., and W. A. Beatty. January 6th, 1939. (523575.)

522. "Radio transmission systems." Kolster-Brandes, Ltd., and W. A. Beatty. January 6th, 1939. (523604.)

523. "Type-printing telegraph receivers." Standard Telephones & Cables, Ltd., and G. A. M. Hyde. January 6th, 1939. (523576.)

550. "Electric wiring systems and cables suitable for use for conducting high frequencies.' Marconi's Wireless Telegraph Co., Ltd., and J. S. Swift. January 6th, 1939. (523484.)

551. "Electrical arc discharge tubes." Marconi's Wireless Telegraph Co., Ltd. January 7th, 1938. (523485.)

622. "Control systems for variable speed engine - driven dynamo - electric generators." English Electric Co., Ltd., P. Evans, L. Roberts, and R. D. Ball. January 7th, 1939. (523494.)

715. "Television systems or the like." B. J. Edwards and Pye, Ltd. January 9th, 1939. (523611.)

729. "Electrically operated exterminator for insects such as blow-flies." R. Symon and L. W. Buddle. January 9th, 1939. (523716.)

796. "Devices for tuning radio receivers." M. Yardeny. January 13th, 1938. (523508.)

806. "Pulsating electrical control systems." Standard Telephones & Cables, Ltd. January 11th, 1938. (523509.)

807. "Control arrangements of carrier transmission systems." Standard Telephones & Cables, Ltd., F. C. Wright, J. G. Hodgson, and A. H. Roche. January 10th, 1939. (523615.)

808. "Cathode-ray tubes and circuits therefor." Kolster-Brandes, Ltd., and D. S. B. Shannon. January 10th, 1939. (523616.)

848. "Electro-pneumatic braking apparatus." Westinghouse Brake & Signal Co., Ltd., A. G. Kershaw and A. W. Simons. January 10th, 1939. (523516.)

850. "Telephone systems." Siemens Bros. & Co., Ltd., C. L. Peters, H. E. Humphries and B. A. Hensler. January 10th, 1939. (Addition to 499832.) (523517.)

868. "Thermionic cathodes." W. L. W. Schallreuter. January 10th, 1939. (523622.)

894. "Electric fuses." Walsall Conduits, Ltd., and E. Gough. January 11th, 1939. (523624.)

927. "Electric signalling systems." General Electric Co., Ltd., J. E. Collyer, and N. C. Smart. January 11th, 1939. (523628.)

936. "Directional light fittings." General Electric Co., Ltd., and J. G. Christopher. January 11th, 1939. (523630.)

941. "Overload electric relays." Igranic Electric Co., Ltd., and C. E. Randall. January 11th, 1939. (523633.)

943. "Cartridge fuses." Callender's Cable & Construction Co., Ltd., P. V. Hunter, and A. Metcalf. January 11th, 1939. (Addition to 475448.) (523634.)

954. "Alternating electric current rectifiers of the selenium type." Westinghouse Brake & Signal Co., Ltd., L. E. Thompson, and A. Jenkins. January 11th, 1939. (523673.)

970. "Means for preventing sparking in electric switches." Aron Electricity Meter, Ltd., and E. J. Riordan. January 11th, 1939. (523674.)

998. "Electrical selective signalling systems." Automatic Telephone & Electric Co., Ltd., and A. P. B. Renshaw. January 11th, 1939. (523640.)

999. "Directional antenna systems." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 14th, 1938. (523641.)

1070. "Systems for limiting electric loads." P. Schiller. January 12th, 1939. (523689.)

1086. "Coil formers." Plessey Co., Ltd., and F. G. Gillard. January 12th, 1939. (523692.)

1106. "Radio and like receivers." Marconi's Wireless Telegraph Co., Ltd., and O. E. Keall. January 12th, 1939. (523697.)

1166. "Electric lamp and reflector fittings." Veritys, Ltd., and J. W. Forth. January 13th, 1939. (523726.)

1173. "Lever-operated switches." C. H. Parsons, Ltd., and G. B. Handley. January 13th, 1939. (523728.)

1174. "Lever - operated electric switches." C. H. Parsons, Ltd., and G. B. Handley. January 13th, 1939. (523729.)

1181. "Electromagnetic step-by-step selectors." Ericsson Telephones, Ltd., and C. W. Wilman. January 13th, 1939. (523730.)

1209. "Electric lampholders and adaptors therefor." General Electric Co., Ltd., and F. G. Allen. January 13th, 1939. (523740.)

1217. "Radio broadcast receiving sets." Standard Telephones & Cables, Ltd. February 3rd, 1938. (523742.)

1233. "Permanent brake magnets of high coercive force." Landis & Gyr Akt. Ges. December 3rd, 1938. (523747.)

1235. "Electric cables." Liverpool Electric Cable Co., Ltd., R. F. D. Milner and J. T. Frost. January 13th, 1939. (523748.)

1244. "Secret telephony." M. Wald and J. Engelmayer. January 13th, 1939. (523750.)

1255. "Electric power systems." Westinghouse Electric International Co. January 28th, 1938. (523755.)

1262. "Electric drum controller arrangements." Vereinigte Eisenbahn-Signalwerke Ges. January 21st, 1938. (523757.)

1276. "Plug-and-socket connectors for electric circuits." C. L. Arnold and M.K. Electric, Ltd. January 13th, 1939. (523760.)

1284. "Point and signal control systems for railways and the like." Westinghouse Brake & Signal Co., Ltd., and C. F. D. Venning. January 14th, 1939. (523762.)

1328. "Multi-valve high-frequency oscillators." Standard Telephones & Cables, Ltd., and J. Foster. January 14th, 1939. (523764.)

17156. "Electric gas-filled incandescent lamps." Philips Lamps, Ltd. June 14th, 1938. (523589.)

23786. "Electrical oscillation generators." Marconi's Wireless Telegraph Co., Ltd., and J. F. Ramsay. January 10th, 1939. (Divided out of 513679.) (523648.)

24294. "Methods of coating luminescent envelopes." British Thomson-Houston Co., Ltd. August 24th, 1938. (523528.)

Transport (*Concluded*)

to pay higher fares in towns which have adopted oil buses than in those which have retained their trams or trolley-buses.

Spain.—RAILWAY ELECTRIFICATION TO PROCEED.—A decree authorising the continuation of the electrification of the Madrid-Avila-Segovia railway line is published, in *Ferrocarriles y Tranvias*.

United States.—CHICAGO TROLLEY-BUSES.—Praise for trolley-buses was the keynote of a paper presented by Mr. J. B. O'Connell, assistant superintendent of transportation, Chicago Surface Lines, at a recent meeting of the Central Transit Equipment Association at Cleveland. The original service, in 1930, comprised 79 vehicles, and the results have been so satisfactory that the system has been almost doubled in size, being operated now by approximately 152 vehicles. Last year the trolley-buses covered 4,500,000 miles and carried 35,000,000 passengers.

On the Central Avenue route of 7½ miles the single-deck vehicles travel at an average speed of 12.87 MPH and during the morning peak 5,900 passengers have been carried in an hour in one direction at the maximum load on 84 trolley-buses. On the Diversity Avenue route an average speed of 13.2 MPH is maintained. On each of these routes, states Mr. O'Connell, the trolley-bus is more economical and gives a better quality service than the petrol bus. An important point, he says, is that the heating, lighting and ventilating of vehicles can be accomplished much more easily, the source of power being ample and ideal, and he considers that the added comfort thus made possible is a significant factor in the popularity of trolley-buses.

NEW TROLLEY-BUS INSTALLATIONS.—On June 2nd a fleet of 35 trolley-buses was commissioned at Denver, Colorado, as the first step in a five-year plan adopted after an intensive survey undertaken with a view to modernising the transport system, states *Mass Transportation*. As a result of the survey four tram routes are to be replaced by trolley-buses. At Shreveport, La., eleven more trolley-buses were recently added to the fleet and the system is now completely railless. In view of an increase in traffic of 35 per cent. following the conversion of one route to trolley-bus operation, the Baltimore Transit Co. has recently added 40 more of these vehicles to its system. Memphis, Tenn., and Providence, R.I., have also extended their use of trolley-buses.

FINANCIAL SECTION

New Companies. Capital Returns. Debenture Charges. Bankruptcies and Liquidations. Reports and Dividends. Stocks and Shares

New Companies Registered

Browning's Electric Co., Ltd.—Private company. Registered August 5th. Capital, £1,000. Objects: To carry on the business of factors, manufacturers and repairers of and dealers in electrical goods of all kinds, dynamos, motors, armatures, batteries, &c. Directors: W. H. Browning (permanent governing director), 69, Milton Cres., Ilford, Essex, and R. W. Browning, 7, Lonsdale Cres., Ilford. Registered Office: Imperial Works, St. Martin's Avenue, East Ham, E.6.

Century Engineers, Ltd.—Private company. Registered August 6th. Capital, £1,500. Objects: To carry on business as founders, smiths, metal workers, machinists, mechanical, electrical and general engineers, &c. Directors: G. J. McLaren, Home Farm, Belford, Northumberland, H. G. Davis, 5, Elgy Road, Gosforth, and W. McLaren, address not stated.

Brand Accessories, Ltd.—Private company. Registered August 7th. Capital, £100. Objects: To carry on the business of manufacturers and importers of and dealers in electrical goods, appliances and accessories, metal, wooden, rubber, cardboard, paper, cloth, wax, celluloid and wireless goods, &c. Arthur J. Brand, 40, Princess Court, Wembley, is the first director. Registered office: Capitol Buildings, Empire Way, Wembley.

Waygood Radiovision, Ltd.—Private company. Registered August 2nd. Capital, £100. Objects: To carry on the business of manufacturers of and wholesale and retail dealers in wireless apparatus, equipment, accessories, components and parts, &c. Subscribers: L. Tobias, 8, Burdenshott Avenue, Richmond, Surrey, and P. D. Nully, 101, Alexandra Road, N.W.8. Solicitor: Lucien Fior, 2, Bloomsbury Street, W.C.1.

Belnon Plastics, Ltd.—Private company. Registered August 1st. Capital £500. Objects: To carry on the business of manufacturers of and dealers in bakelite, ebonite, vulcanite, amber, ivory, ivorine, erinoid, celluloid, mother of pearl, plastic products, rubber and rubber products and all other materials used in the manufacture of electrical, scientific and other accessories, &c. Subscribers: J. C. Day, 53, The Charter Road, Woodford Green, Essex, and J. L. Vann, The Pathways, Wellington Avenue, Hatch End, Middx. Secretary: J. C. Day, 6, Wardrobe Place, E.C.4.

H. P. Hunter, Ltd.—Private company. Registered August 10th. Capital, £100. Objects: To acquire the business of a wholesale radio, electrical and cycle factor carried on by H. P. Hunter at 59-61, Stockport Road, Ashton-under-Lyne. The directors are: H. P. Hunter (managing director) and Mrs. A. Hunter, both of 59-61, Stockport Road, Ashton-under-Lyne.

C. M. Churchouse, Ltd.—Private company. Registered August 10th. Capital, £3,000. Objects: To carry on business as manufacturers of and dealers in electric light fittings, glassware, &c. The directors are: C. M. Churchouse and P. F. Churchouse, both of 160, Holland Road, Kensington, W.14. Registered office: Clarendon Works, Clarendon Close, Notting Hill, W.11.

Companies' Returns

Statements of Capital

Hall Telephone Accessories (1928), Ltd.—Capital, £500,000 in 1,000,000 ordinary shares of 10s. Return dated May 9th. 645,120 shares taken up. £203,148 10s. paid on 406,297 shares. £119,411 10s. considered as paid on 238,823 shares. Mortgages and charges nil.

Electrical Facilities, Ltd.—Capital, £350,000 in £1 shares. Return dated May 22nd. 291,667 shares issued and fully paid up, plus 2s. 6d. per share premium on 91,667 shares. Mortgages and charges nil.

Switchgear Testing Co., Ltd.—Capital, £30,000 in £1 shares. Return dated March 28th. All shares taken up. £30,000 paid. Mortgages and charges nil.

Cahier's Electrical Vibrator Co., Ltd.—Capital, £500 in £1 shares. Return dated December 31st 1939. 361 shares taken up. £361 paid. Mortgages and charges nil.

Automobile Electrics, Ltd.—Capital, £500 in £1 shares. Return dated May 7th. 225 shares taken up. £225 paid. Mortgages and charges £600.

White, Drummond & Co., Ltd.—Capital, £350,000 in £1 shares. Return dated April 1st. 65,000 shares taken up. £54,500 paid, £10,500 considered as paid. Mortgages and charges nil.

Power Installations, Ltd. — Capital, £1,000 in £1 shares. Return dated December 30th, 1939 (filed June 1st, 1940). All shares taken up. £1,000 paid. Mortgages and charges, £1,633.

Electric Ignition Laboratory, Ltd.—Capital, £2,000 in £1 shares. Return dated March 16th. 1,500 shares taken up. £1,500 considered as paid. Mortgages and charges, nil.

Atlantic Appliances, Ltd. — Capital, £500 in £1 shares. Return dated January 3rd (filed March 13th). 202 shares taken up. £102 paid. £100 considered as paid. Mortgages and charges, nil.

Midland Electric Manufacturing Co., Ltd.—Capital, £225,000 in 150,000 ordinary and 75,000 preference shares of £1. Return dated March 27th, 1940. All shares taken up. £85,000 paid on 25,000 preference and 60,000 ordinary shares. £140,000 considered as paid on the remainder. Mortgages and charges nil.

Magenerator, Ltd.—Capital, £525 in 500 preference shares of £1 and 500 ordinary shares of 1s. each. Return dated March 26th, 1940. 275 preference and 300 ordinary shares taken up. £290 paid. Mortgages and charges nil.

Mortgages and Charges

Notek Electric Co., Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated July 24, 1940, to secure £1,300. Holder: F. H. Noran, 19, Campden Hill Gate, Kensington, W.8.

Milnes Electrical Engineering Co. (Bingley), Ltd.—Assignment dated July 18th, 1940, to secure all moneys due or to become due from the company to Barclays, Bank, Ltd., charged on moneys due under a contract dated April 18th, 1940.

Ray Engineering Co., Ltd.—Satisfaction to the extent of £300 on July 22nd, 1940, of debentures authorised June 14th, 1936, and registered July 7th, 1936 .(According to the register of mortgages the debentures registered July 7th, 1936, originally secured sums not exceeding £800.)

Richard Crittall & Co., Ltd.—Mortgage on land in Great West Road, Old Brentford, dated July 18th, 1940, to secure all moneys due or to become due from the company to National Provincial Bank, Ltd.

G. T. Bellamy & Co., Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated July 25th, 1940, to secure £200. Holders: Mrs. Lilian Bellamy, 33, Cherry Orchard Road, Croydon.

J. G. Smithson & Co., Ltd.—Mortgage on all moneys due or to become due under certain contracts, dated July 29th, 1940, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £500.

Receiver Released

Western Electrical Power Co. (Liverpool), Ltd.—G. F. Saunders, of 3, Lord Street, Liverpool, ceased to act as receiver and/or manager on August 2nd, 1940.

Increase of Capital

Spicers (Electrical), Ltd.—The nominal capital has been increased by the addition of £2,000 in £1 ordinary shares beyond the registered capital of £500.

Company Liquidations

Universal Radio Distributors, Ltd.—Meetings September 11th at 25-27, Oxford Street, London, W.1, to receive an account of the winding-up by the liquidator, Mr. L. V. Smith.

Henley Extrusion Machine Co., Ltd.—Meetings September 12th, at 5, London Wall Buildings, London, E.C.2, to receive an account of the winding-up by the liquidator, Mr. H. Hockley.

Bankruptcy Proceedings

R. A. J. Tully, electrician, 30, Clyde Road, Brighton.—Receiving order made July 31st on a creditor's petition. Public examination September 13th, at the Court House, Brighton.

E. E. Garfield, electrician, 49, Ormond Street, Aston, Birmingham.—Receiving order made August 7th on debtor's own petition.

Reports and Dividends

Falk, Stadelmann & Co., Ltd.—Presiding at the annual meeting on August 8th, Mr. Max Falk (chairman) said that the prevailing conditions affected the demand for many of the classes of goods manufactured by them and their subsidiaries, and as a result production decreased, and in some cases dwindled into insignificance. An instance was the neon sign business, which had entirely ceased owing to the black-out. The resources of their various works were placed at the disposal of the Government Departments, and they obtained contracts for the Navy, Army and Air Force, which, in a measure, compensated for the displacement of normal peacetime products.

In common with others they experienced difficulty in obtaining the requisite raw materials and especially a sufficiency of skilled labour. Their cable works, however, had been actively engaged from the outset of the war and were working at a great pressure in the production of materials to meet special war service requirements. It was regrettable that the extensions to these works, which were in hand before the outbreak of war, could not be completed owing to it becoming impossible to obtain delivery of special plant. The Government's policy of fostering export business was being strongly supported by them through membership of various export groups and contact with overseas markets was being maintained through their organisations, especially in the Colonies and Dominions.

The Wolseley Sheep-Shearing Machine Co., Ltd., reports a net profit for 1939 of £7,863, as compared with £14,314 for the preceding year. The dividend for the year is 11 per cent. (against 10 per cent.), and £12,313 is carried forward (against £10,775 brought in). The report states that the company's standard for E.P.T. purposes has not yet been fixed, and it is therefore impossible to estimate whether or not there will be any E.P.T. liability on profits. In these circumstances no provision has been made for such liability, if any.

Solus Teoranta, of Dublin, reports profits for 1939 of £25,378, as against £20,436 for the previous year. The final dividend is 5 per cent., plus a bonus of 2½ per cent., making 12½ per cent. for the year (same). Tax reserve receives £8,000, general reserve £4,000, and the staff fund £1,000. The balance carried forward is £1,336 (against £1,362 brought in).

James Howden & Co., Ltd., report a profit to April 30th, of £105,871, as compared with £99,662 for the preceding ten months. The ordinary dividend is maintained at 1s. 6d. per share, and £17,693 is carried forward (against £18,659 brought in).

The Jerusalem Electric & Public Service Corporation, Ltd., in a preliminary statement, reports a profit for the year to March 31st of £P.70,615, as compared with £P.64,520. Tax provision requires £P.20,000, general reserve

(*Continued on page* 141.)

STOCKS AND SHARES

TUESDAY EVENING.

INTENSIFICATION of the war in the air seems to have added to the stagnation which had previously prevailed in Stock Exchange markets. The continual drive on the part of the Government for public subscription to National War Bonds and other forms of borrowing, has the natural effect of drawing money away from other investments. Yet it is noticed that when stocks and shares come to market, through the medium of a deceased account or the like, little trouble is experienced as a rule in placing stock that has security to recommend it.

Something of a feature at the moment is the readiness with which preference shares are being taken. Not long ago, it was a matter of some difficulty to dispose of any reasonable line of preference shares, however well secured they might be. To-day, notwithstanding the Government's appeals, preference shares in good-class concerns are readily saleable. Speculation has come to a standstill, as, by the way, it usually does during August, but there is still a trickle of investment business going on. War 3½ p.c. stock is 100, and industrials are mostly very firm.

Home Railway Factors

To what extent the apprehension of air raids is being carried in the mind of the present-day investor can be seen by a reference to the prices of home railway stocks, covered as many of these are by a Government guarantee for the period of the war and a little after.

Southern Railway 5 per cent. preferred stock has given way to 46, at which the return on the money comes to nearly 11 p.c. On the Government agreement, the payment of the dividend during the war would appear to be well secured, leaving out of account the possibility of such damage by aircraft as would affect all the railway companies, over and above the amount guaranteed to them by the Government for the war period.

London Passenger Transport "C" stock has declined to 28. The fall is due less to any particular pressure to sell, than to an almost complete absence of buying on behalf of the public. At the present price, the stock would appear to be cheap, though by comparison with some of the others in the same group the present yield is admittedly modest.

Misleading Quotations

It may not have escaped notice that in the Stock Exchange Official List of Corporation, County Stocks, and Public Boards there are several gaps where, formerly, quotations appeared against the name of the security. In all these cases, a minimum price is given in the List. The absence of a current quotation is due to the fact that there are no buyers at the minimum prices, and the removal of any current figure is an indication that the stocks are, for the moment, unsaleable at the minima. Valuations for death duties, etc., must be made at the minimum prices in all such cases as those where dots, instead of figures, appear against the stock in the Stock Exchange Lists. This represents a saving to the executor, or to whoever else is dealing with an estate which comprises stocks to which minimum prices are attached. On the other hand, the executor desirous of raising money for payment of death duties, is likely to be far from pleased if on trying to sell some particular stock he finds it is one of those that are, for the time being, literally unsaleable.

Price-lists and Rationed Paper

Reference was made here last week, on page 119, to the withdrawal from official quotations of a number of Stock Exchange securities previously appearing every business day. The weeding-out process has had to be undertaken slowly, but the elimination is now virtually complete. Among the shares removed are five which figure in our price-lists, and which for the present shall remain there as usual. They are Notting Hill preference, Aron Electricity, Electrical Switchgear, Metropolitan Electric Cable preference, and Ward & Goldstone.

The principle applied in this deletion has been to remove the shares in which no record of actual business has been marked for six months past. All securities failing to comply with this requirement have been taken out. If a bargain is done in any of them, the record will appear in what the Stock Exchange Committee—in a spasm of surprising modernity—calls the "Stop Press." Lest a company should esteem it a stigma to have its stock or shares withdrawn from daily official quotation, the Committee, after lengthy debate, agreed to insert the word "temporarily" in the printed notice of removal.

Electricity Supply Dividends

The Northampton Electric Light Company has declared an interim dividend of 4 per cent., the same as that of a year ago. The final of 6 per cent. made 10 per cent. for 1939. At the present price of 38s. 9d., ex dividend, Northamptons pay £5 3s. 3d. per cent. on the money. Broadly speaking, anticipation looks for a possible reduction in the 1940 dividends of those companies which have been paying a high rate. Bournemouth & Poole, for example, pays 15 per cent., County of London 10½ per cent., Electric Finance and Securities 12½ per cent. The impression prevails that shares such as these are more vulnerable to a possible dividend reduction than are the various others that pay 7 or 8 per cent. dividend for the full year. Study of the current prices, last dividend and present yields as set out in our tables, goes to support the view that dividend reduction is not looked for in the majority of cases. Observation will note the difference in the yields offered by shares in individual companies: this difference gives a key to the prophetic judgment of the investor—and the Stock Exchange market—in regard to the full dividends for 1940. The recent course of quotations implies that dividend cuts have been discounted in cases where they are likely to be made.

General Insurance

So reasonable, on the face of it, appears the proposal that electricity supply authorities should form an insurance fund amongst themselves against conceivable damage by air raids, that its acceptance has been taken more or less for granted. It served to impart a firmer tendency last week to the market for the supply companies' shares. Changes this week in the home group include a rise of 2s. in Edmundsons 7 per cent. preference to 28s. 3d. and of $\frac{1}{16}$ in North Eastern ordinary to 22s. 6d. In the Overseas section, Palestine Electric "A" have fallen to 13s. 9d., the lowest reached this year, due to the development of war conditions in the Near East. East African Power dropped back to 20s. Victoria Falls Power ordinary at 65s. have lost $\frac{1}{16}$ of the rise brought about by the satisfaction felt with the recent report and figures. Shares in the Indian section hold their prices with firmness, although there is not a great deal of business being done in them.

Amongst 4 per cent. debenture stocks to go better, British Aluminium at 101 and English Electric at 97½ are up 1½ and 3 points this week.

B.E.T.

Thomas Tilling shares, quoted ex-dividend on Monday in this week, at 31s. 3d. show a loss of about 1s. 9d. per share, allowing for deduction of the dividend of 1s. The prices of British Electric Traction remain unchanged at 525 for the deferred ordinary and 140 for the preferred ordinary. A reader courteously writes to point out that in calculating the market value of British Electric Traction deferred stock, an error occurred in making this £40,000,000. The actual figure should, of course, be a little under £4,000,000. The sum, having regard to the holdings of the British Electric Traction Company, cannot be called extravagant. Were the times a little less out of joint than they are, it might well be assumed that British Electric Traction deferred would not be standing at a price so low, considering the nature of the security, as to afford a yield on the money of over 8½ per cent.

Pye Radio

As an illustration of the way in which lack of public interest can affect the market price of shares, it may be noticed that Pye Radio deferred shares of 5s. each, standing at 8s. middle, give a yield at that price of over 15 per cent.

The report, out the other day, showed the company to be making steady progress. It is engaged not only upon radio work, but also upon Government orders. Were there to be any popular interest in the shares, the price would stand, as a conjecture, several shillings higher.

The argument against investment in radio shares of any kind is that the conditions in the trade alter so quickly that the favourite of to-day is liable to be superseded and to become out of date to-morrow. Pye, however, is one of those companies in which the managements have hitherto succeeded in keeping well abreast of the times. As mentioned above, the report for the year recently ended made very pleasant reading for the shareholders.

Cable and Wireless

Difficulties and delays in wartime methods of communication make an added justification, the buyers of Cable and Wireless stocks contend, for continued purchases. The 5½ per cent. preference at 82 and the ordinary at 44½ have followed up their last week's gains with further advances of 2 and 4 points respectively. As it required the offer of no more than a modicum of stock recently to depress the prices, so now, with inquiries afoot, the absorption of some quite small amount is sufficient to redress the balance of prices. The delays to-day attendant upon mail services to India and the East compel the use of the cable when promptitude is essential. The cable is being used nowadays by people who never thought of it when mails were normal. The traffics of the combine, no longer published monthly as in peacetime, are said by report to show steady expansion. Moreover, the buying of the stocks is what the Stock Exchange calls knowledgeable.

Aron Electric

The announcement from Aron Electricity Meter, Ltd., on Tuesday in this week that the company proposed to pay no dividend for last year came as a surprise. Although the interim had been passed last February, anticipation looked for at least some small distribution for the full twelvemonth. Aron Electricity paid 15 per cent. regularly every year for the five years 1935-1939 inclusive; and 10 per cent. in each of the two previous years. The company carries on the business of the manufacture of electricity meters in England and Austria. Through Aron Taximeter, Ltd., it also manufactures taximeters. The issued capital is 151,936 ordinary shares of £1 each, fully paid. The price of these shares is nominally about 10s.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1940 Highest	1940 Lowest	Dividend Previous	Dividend Last	Middle Price Aug. 13	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies							
Bournemouth and Poole	63/6	42/6	15	15	42/6	...	7 1 2
British Power and Light	30/–	21/–	7	7	21/6	...	6 10 4
City of London	28/–	20/–	7½	7½	21/–	...	7 2 10
Clyde Valley	38/6	25/–	8	8	28/9	...	5 11 4
County of London	43/3	22/–	10½	10½	27/6	...	7 12 8
Edmundson's:							
7% Pref.	31/6	26/3	7	7	28/3	+2/–	4 19 1
Ord.	27/6	18/6	9	6	21/6	...	5 11 7
Elec. Dis. Yorkshire	40/3	32/6	9	9	32/6xd.	...	5 10 9
Elec. Fin. and Securities	41/3	38/6	12½	12½	38/9	...	6 9 0
Elec. Supply Corporation	46/3	38/6	12	11½	38/9	...	5 18 7
Isle of Thanet	16/–	5/6	4	4	6/–	...	13 6 8
Lancs Light and Power	33/–	25/–	7½	7½	26/3	...	5 14 3
Llanelly Elec.	21/–	17/0	5½	5½	18/–	...	6 2 2
Lond. Assoc. Electric	21/–	12/6	7	5½	13/9	...	—
London Electric	37/6	19/–	8	7	20/–	...	7 0 0
London Power Deb. Red.	105½	101	5	5	101½	...	4 18 6
Metropolitan	41/6	23/6	12	10	28/3	...	7 1 6
Midland Counties	39/–	24/3	8	8	27/6	...	5 16 5
Mid. Elec. Power	40/–	29/6	9	9	31/3	...	5 12 2
Newcastle Elec.	29/9	24/6	7	7	24/6	...	5 14 3
North Eastern Electric:							
Ordinary	31/6	17/6	7	7	22/6	+⅛	6 11 9
7% Pref.	32/6	26/6	7	7	27/6	...	5 1 10
Northampton	48/–	39/–	10	10	38/9xd.	...	5 3 3
Notting Hill 6% Pref. (£10)	10⅜	9	6	6	9	...	—
Northmet Power:							
Ordinary	42/3	23/–	10	10	27/6xd.	−9d.	—
6% Pref.	29/–	23/–	6	6	26/–	...	4 12 4
Richmond Elec.	24/6	18/–	7	6	20/–	...	6 0 0
Scottish Power	38/–	24/–	8	8	28/3	...	5 13 4
Southern Areas	21/3	13/9	5	5	13/9	...	7 5 6
South London	23/3	20/–	7	7	20/–	...	7 0 0
West Devon	20/–	18/6	5	5	20/–	...	5 0 0
West Glos.	21/3	15/–	2½	4½	16/3	...	5 13 10
Yorkshire Elec.	40/–	24/6	8	8	28/9	...	5 11 5
Overseas Electricity Companies							
Atlas Elec.	4/–	1/3	Nil	Nil	1/9	...	—
Calcutta Elec.	37/–	22/6	10*	8*	27/6	+6d.	5 18 6
Cawnpore Elec.	30/–	24/–	10	10	25/–	...	8 0 0
East African Power	25/6	20/–	7	7	20/–	−⅛	7 0 0
Jerusalem Elec.	24/–	17/9	7	7	18/9	...	7 9 4
Kalgoorlie (10/–)	12/6	9/6	7½	7½	11/–	...	6 16 5
Madras	26/9	25/–	8*	6*	25/–	...	4 16 0
Montreal Power	35¼	30	1½	1½	32	...	—
Palestine Elec. "A"	25/–	13/–	5*	Nil	13/9	−⅛	—
Perak Hydro-electric	20/3	13/6	6	2½	13/9	...	3 12 9
Shawinigan Power	27½	19	83cts.	90cts.	20½	...	—
Tokyo Elec. 6%	69	52	6	6	52½	...	11 8 6
Victoria Falls Power	75/9	56/–	15	15	65/–	−⅛	4 12 4
Whitehall Investments Pref.	17/9	8/–	7½	7½	9/6	+6d.	15 16 0
Public Boards							
Central Electricity:							
1950–70	110½	104	5	5	104½	...	4 15 8
1955–75	112½	106	5	5	106½	...	4 14 0
1951–73	107½	102	4½	4½	102½	...	4 7 10
1963–93	96½	90	3½	3½	90	—1	3 17 9
London Elec. Trans Gtd.	92	87½	2½	2½	89	...	2 16 2
London & Home Counties							
1955–75	113½	105	4½	4½	105½	...	4 5 4
Lond. Passenger Transport							
A	116	104	4½	4½	107	...	4 4 0
B	116	102½	5	5	104½	...	4 15 8
C	65½	25	1½	1½	28	...	5 7 2
West Midland Joint Elec.							
1948–68	106½	105	5	5	105½	...	4 14 9
Telegraph and Telephone							
American Tel. & Tel.	215	180	9	9	190	...	4 14 9
Anglo-Am. Tel.:							
Pref.	106	85	6	6	87	...	6 18 0
Def.	23⅜	18	1½	1½	18½	...	8 2 2
Anglo-Portuguese	22/6	10/–	8	8	11/3	...	14 4 6
Cable & Wireless:							
5½% Pref.	90⅜	70	4½	5½	82	+2	6 14 2
Ord.	65	28½	4	4	44½	+4	9 0 0
Income	90⅜	93	...	...	97	...	4 2 4
Canadian Marconi $1	6/–	4/–	Nil	4cts.	4/3	...	—
Globe Tel. & Tel.:							
Ord.	32/6	21/6	7½*	6*	25/–	...	4 16 0
Pref.	22/9	22/6	6	6	23/9	...	5 1 1
Great Northern Tel. (£10)	20	11	20	20	12½	...	—
Inter. Tel. & Tel.	5½	3	Nil	Nil	3	...	—
Marconi-Marine	30/–	18/3	10	7½	18/9	...	8 0 0
Oriental Telephone Ord.	2⅞	49/–	12*	11½*	2½	...	4 12 0
Telephone Props.	15/–	11/6	5	6	12/6	...	9 12 0
Telephone Rentals (5/–)	9/6	5/9	10	10	5/9	...	8 14 0
Traction and Transport							
Anglo-Arg. Trams:							
First Pref. (£5)	4/3	1/3	Nil	Nil	2/–	...	—
4% Inc.	11½	2	Nil	Nil	3½	...	—
British Electric Traction:							
Def. Ord.	830	440	5	45	525	...	8 11 6
Pref. Ord.	169	134	8	8	140	...	5 14 3
Bristol Trams	48/6	34/6	10	8*	35/–	...	—
Brazil Traction	12½	5½	$1	50c.	5½	...	—
Calcutta Trams	24/–	16/3	8	5½	17/–	...	6 9 4
Cape Elec. Trams	18/6	16/–	5	5	17/–	...	5 17 8
Lancs Transport	35/–	27/6	10	10	30/–	...	6 13 4
Mexican Light:							
1st Bonds	33	27	5	5	27½	...	—
Rio 5% Bonds	90	74	5	5	80	...	6 5 0
Southern Rly.:							
5% Prefd.	79	35	5	5	46	−1	10 17 4
5% Pref.	104½	60	5	5	77	−1	6 9 10
T. Tilling	45/9	31/–	10	10	31/3xd.	−1/9	6 8 0
Tilling & B.A.	47/6	43/9	9*	8*	45/–	...	—
West Riding	35/–	26/–	10	10	26/–	...	7 14 0
Equipment and Manufacturing							
Aron Electricity Ord.	17/6	10/–	15	Nil	10/–	...	—
Assoc. Elec.:							
Ord.	43/3	27/–	10	10	36/3	...	5 10 4
Pref.	35/3	32/3	8	8	33/9	...	4 14 10
Automatic Telephone & El.	47/3	32/–	12½	12½	35/–	...	7 2 10
Babcock & Wilcox	50/–	28/6	10	11	32/6	...	6 15 4
British Aluminium Ord.	56/–	33/–	12½	12½	33/3	−⅛	7 11 3
British Insulated Ord.	92/6	67/–	20	20	72/6	...	5 10 4
British Thermostat (5/–)	14/9	6/6	18½	18½	7/6	...	12 6 8
British Vacuum Cleaner(5/-)	12/6	6/3	40	12½	6/3	−3/16	10 0 0
Brush Ord.	4/6	2/–	Nil	Nil	2/6	...	—
Callender's	69/–	46/–	15	15	50/–	...	6 0 0
Chloride Elec. Storage	72/6	55/–	15	15	2⅞	−½	5 4 4
Consolidated Signal	72/6	59/–	36½	17	60/–	−½	5 13 4
Crabtree (10/–)	24/9	17/6	17½	17½	20/–	...	8 15 0
Crompton Parkinson:							
Ord. (5/–)	20/–	12/6	30	20	15/–	...	6 13 4
E. K. Cole (5/–)	5/–	2/6	10	Nil	3/0	...	—
Elec. & Musical Industries (10/–)	10/3	4/3	5	Nil	6/–	—	—
Electric Construction	36/3	30/–	13½	10	30/–	...	6 13 4
Enfield Cable Ord.	56/–	40/6	25	16½	45/–	...	7 13 0
Electrical Switchgear (10/–)	22/6	20/–	16	10	20/–	...	5 0 0
English Electric	33/9	16/6	10	10	22/6	...	8 18 0
Ensign Lamps (5/–)	15/3	13/9	25	25	13/9	...	9 1 10
Ericsson Tel. (5/–)	39/3	25/–	25*	25*	25/–	...	5 0 0
Ever Ready (5/–)	28/3	17/3	30	40	22/6	+1/–	8 18 0
Falk Stadelmann	18/3	12/6	6	7	13/9	...	8 14 6
Ferranti Pref.	25/–	23/–	7	7	25/–	...	5 12 0
G.E.C.:							
Pref.	32/6	27/–	6½	6½	28/9	...	4 10 6
Ord.	83/3	56/–	20	20	68/9	...	5 16 3
Greenwood & Batley	25/6	20/–	15	13	20/–	...	13 0 0
Hall Telephone (10/–)	18/6	11/–	15	10	11/3	...	—
Henley's (5/–)	21/6	13/6	20	20	16/3	...	6 3 1
4½% Pref.	21/3	20/6	4½	4½	21/3	...	4 4 8
Hopkinsons	46/9	33/6	12½	15	35/–	+⅛	8 11 6
India-Rubber Pref.	21/–	20/–	5½	5½	20/9	...	5 6 0
Intl. Combustion	121/3	70/0	32½	32½	4	...	8 2 6
J. Lucas	60/6	40/–	15	15	47/6	+⅛	6 6 4
Johnson & Phillips	50/9	33/–	12½	15	37/6	...	8 0 0
Lancashire Dynamo	59/9	47/6	25	20	47/6	...	8 8 5
Laurence Scott (5/–)	11/–	6/–	15	15	8/–	...	9 7 6
London Elec. Wire	25/6	20/–	7½	7½	22/6	...	6 13 4
Mather & Platt	46/6	30/–	13½	10	31/3	+6d.	6 8 0
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	...	5 3 6
Murex	86/9	52/6	20	20	67/6	+⅛	5 18 6
Pye Deferred (5/–)	9/–	6/9	25	25	8/–	...	15 12 6
Revo (10/–)	20/9	12/6	17½	5	12/6	...	4 0 0
Reyrolle	60/6	41/–	12½	12½	41/3	...	6 1 0
Siemens Ord.	23/9	16/3	7½	7½	17/6	...	8 11 6
Strand Elec. (5/–)	2/3	9d.	10	4	1/3	...	10 0 0
S. Smith (1/–)	8/–	3/6	37½	50	3/9	...	13 6 8
Switchgear & Cowans (5/–)	11/9	5/6	20	10	6/3	...	8 0 0
Telegraph Condenser (10/–)	8/9	6/3	5	—	8/9	...	—
Telegraph Construction	42/6	29/–	10	10	30/0	...	6 13 4
Telephone Mfg. (5/–)	9/–	5/–	9	9	5/6	...	8 3 8
Tube Investments	96/9	61/3	23¾	23¾	77/6	+½	6 3 6
Vactric (5/–)	3/6	2/–	4	Nil	2/3	...	—
Vickers (10/–)	22/–	9/6	10	10	12/9	−3d.	7 17 0
Ward & Goldstone (5/–)	19/9	12/6	20	20	12/6	...	8 0 0
Westinghouse Brake	46/–	32/9	17½	10	32/6	...	6 3 1
Walsall Conduits (4/–)	26/6	17/6	55	55	21/3	...	10 7 0
West, Allen (5/–)	7/–	3/–	10	7½	3/9	...	10 0 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.

Australia. — SYDNEY. — October 24th. County Council. One 50,000-kW steam turbo-alternator set for the Bunnerong power station. (T. 16057/40.)*

MELBOURNE.—September 10th. Deputy Director, Posts and Telegraphs. Underground cable. (T. 21127/40).*

Bedford.—Town Council. Equipment for the electricity supply to the Co-operative Wholesale Society, Ltd., and to St. Peter's Hospital.

Bristol.—August 16th. Electricity Department. V.i.r. tough rubber cables, flexibles, &c. (August 9th.)

Gloucester.—August 29th. Corporation. Electrical installation at new maternity hospital. (July 19th.)

Hebburn-on-Tyne (Durham).—Electric pumps for draining air-raid shelters; J. Dibble, Council Offices, Hebburn-on-Tyne.

Middlesbrough.—Electric lighting in public shelter, Victoria Square; C. Gorman, borough engineer.

New Zealand. — WELLINGTON.—September 2nd. Post and Telegraph Department. Copper binders and tapes. (T. 20805/40.)*

October 8th.—Public Works Department. 20,000-kVA synchronous condenser with control and protective equipment. (T. 21199/40.)* Four 2,500-kVA transformers or alternatively eight 1,677-kVA transformers. (T. 21197/40.)*

October 15th.—66-kV outdoor switchgear and steelwork for Winton sub-station (T. 21206/40.)*

South Africa.—PRETORIA.—Union Tender and Supplies Board. August 29th. One bank of six l.v. switches of the air-insulated type for operation on a 380-220-V, three-phase, four-wire, 50-cycle system. (T. 20775/40.)*

October 3rd. Distribution boards, switches and fuses, and switch boxes. (T. 21239/40.)*

August 22nd. Air conditioning plant for the new Magistrates' Courts. (T. 21013/40* One 20-cell 250-Ah accumulator. (T. 21009/40.)* Blended lighting fittings, comprising 25 pendant bowl fittings, each to house one 125-W high-pressure mercury-vapour lamp and three 150-W tungsten filament lamps, complete with chokes and condensers. Also 60 similar fittings, except that the mercury lamp chokes and condensers are to be suitable for 80-W. (T. 21015/40.)*

September 19th. Seven electric passenger lifts, two electric goods lifts and three electric service lifts at the new G.P.O. Building, Cape Town. (T. 21012/40.)*

CAPE TOWN.—September 5th. Electricity Department. Thirty-two 6-ft. eight 4-ft. and 56 2-ft. double-tier heaters for the wards of the Infectious Diseases Hospital. (T. 20785/40.)*

PORT ELIZABETH.—October 10th. City Electrical Engineer's Department. Water tube boiler. (T.Y. 21035/40.)**

Orders Placed

Barking.—Electricity Committee. Accepted. Cables (£444).—Scottish Cables.

Brighouse.—Electricity Committee. Accepted. 350-kVA transformer.—Brush Electrical Engineering Co.

Chesterfield. — Electricity Committee. Accepted. Supply to British Electrical Repairs, Ltd. Cable (£124).—Aberdare Cables. Switchgear (£285).—Switchgear & Cowans.

Colchester.—Town Council. Accepted. Automatic fire protection system (£1,683). —Mather & Platt.

Coventry.—Emergency Committee. Accepted. Electrical work in A.R.P. surface-type shelters on the main traffic routes (£650).—Three Spires Electric.

Gravesend.—Electricity Committee. Recommended. Switchgear at El Teb sub-station (£2,200).—Crompton Parkinson.

Huddersfield.—Electricity Department. Accepted. Repairs to exciter armature at St. Andrews Road generating station.—English Electric Co. Cable for connecting up new distribution switchgear.—British Insulated Cables.

Lancashire. — Education Committee. Accepted. Electrical installation at the Darwen Municipal Technical Evening Institute (£1,080).—S. Dickinson, Ltd.

Sleaford.—Electricity Committee. Accepted. Underground cables and overhead lines to Holdingham (£756).—Callender's Cable & Construction Co.

Wakefield.—Depôt electricity installation (£48).—H. Smith.

West Riding.—Education Committee. Accepted. Electrical work at Steeton Schools.—Beaumont & Blackburn.

Workington. — Electricity Committee. Accepted. Two 300-kVA transformers (£405).—Metropolitan-Vickers Elecl. Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdare. — Shelters for schools (£18,023), for U.D.C.; surveyor, Town Hall.

Aldershot. — Air-raid shelters (20); Borough Surveyor's Office, Municipal Buildings, Grosvenor Road.

Ashington.—Additional public shelters for the U.D.C.; B. Preston, surveyor.

Barrow-in-Furness. — Extensions to Lakeland Laundry, Abbey Road; Lakeland Laundries, Ltd. Remodelling technical college; Education Committee.

Batley.—Houses and bungalow, Heybeck Lane; F. Clough, builder, Tingley Cross Road, Morley, Yorks.

Berkshire.—Operating theatre at Peppard Sanatorium, for Berks and Bucks Joint Sanatorium Committee, Peppard Common; secretary.

Blyth (NORTHUMBERLAND).—More communal shelters (77); T. Hall, Town Hall, Blyth.

Boldon (Co. DURHAM).—Three communal shelters; N. Hindmarsh, U.D.C. Offices, Boldon.

Bolton.—Offices and canteen; Chas. Heaton & Son, Ltd. School shelters (£5,520); borough engineer.

Caernarvon.—Shelters (£5,000), for T.C.; Borough Surveyor's Office, Caernarvon.

Cambridge.—Pump house, for River Great Ouse Catchment Board; W. E. Doran, acting engineer, "Elmhurst," Brooklands Avenue, Cambridge.

Cannock.—Public shelters (£3,400), for U.D.C.; surveyor, Council House, The Green.

Cheltenham.—Temporary church, Uckington; S. H. Denley.

Chesterfield. — Abattoir extensions (£3,871); A. Mason, Ltd. Shelters on 19 sites, for R.D.C. (£64,170); surveyor, Rural Council House, Saltergate.

Consett.—Public shelter for the U.D.C.; R. Gallacher, Ltd., builders, Cemetery Road, Blackhill.

Darlington.—Air-raid shelters; W. J. Pallister, surveyor, R.D.C. Offices, Darlington.

Drayton (SALOP).—Houses; H. Wainwright, surveyor, Town Hall, Market Drayton.

Eire.—WATERFORD.—Blocks of flats; borough surveyor.

CORK.—Alterations and additions to premises at St. Patrick's Quay, for R. Scott & Co., Ltd.; B. O'Flynn & Son, architects, 60, South Mall, Cork.

Essex.—Proposed junior school, Cranham, Upminster; county architect, Chelmsford.

Falkirk.—Boiler house and pump house for James Aitken & Co. (Falkirk), Ltd., brewers; manager.

Gateshead.—Cleansing station at High Teams Institution; borough engineer.

(Continued on next page.)

Financial Section (*Concluded from page 138*)

Reports and Dividends—contd.

£P.1,154, capital amortisation fund £P.5,477, and depreciation £P.19,200. The preference dividend for the year, less tax, absorbs £P.10,238, leaving £P.20,290 (against £P.18,430) for ordinary dividend and carry-forward. The Board states that it cannot make a definite recommendation as to an ordinary dividend until the report and accounts are published, but if no serious deterioration in condition occurs in the interval the directors hope to recommend the same dividend as last year (7 per cent.).

The Young Accumulator Co., Ltd., reports a trading profit for the year ended March 31st of £19,381, as compared with £14,808 for 1938-39, and a net profit of £11,622 (against £7,718). The dividend for the year is maintained at 5 per cent., and with the balance of £5,222 brought in there is a sum available of £11,282. After writing off various items totalling £4,626 there remains £6,656 to be carried forward (subject to E.P.T.). The report states that the turnover continued to expand and was the highest ever reached.

The Nico Light Co., Ltd., reports a net loss for the year ended March 31st of £531, reducing the credit carried forward to £498. The net loss for 1938-39 was £1,651).

Gabriel Wade & English, Ltd., are paying a first and final dividend of 6 per cent., and a bonus of 4 per cent. (same).

Thorn Electrical Industries, Ltd., has announced a dividend of 20 per cent. on the ordinary shares for the year to March 31st (unchanged).

The Mid Southern Utility Co. has declared interim dividends of £2 12s. 3d. per cent. (against £2 19s. 9d. per cent.) on the "A" stock, £1 17s. 3d. per cent. (£2 4s. 9d. per cent.) on the "B" stock, and 2½ per cent. (same) on the "C" stock.

Waste Heat and Gas Electrical Generating Stations, Ltd., is again paying an interim ordinary dividend of 2½ per cent.

The Northampton Electric Light and Power Co., Ltd., is maintaining its interim dividend at 4 per cent. on the ordinary stock.

The Rushden and District Electric Supply Co., Ltd., has declared an interim dividend of 4 per cent. (same).

The Rangoon Electric Tramway and Supply Co., Ltd., has declared an interim dividend of 4 annas per share, free of Burman income tax.

The Bournemouth & Poole Electricity Supply Co., Ltd., has declared an interim ordinary dividend of 5 per cent. on account of 1940 (against 6 per cent.).

The Richmond (Surrey) Electric Light & Power Co., Ltd., has announced an interim ordinary dividend of 2 per cent. (against 3 per cent.).

The South London Electric Supply Corporation, Ltd., is maintaining its interim ordinary dividend at 3 per cent.

Aron Electricity Meter, Ltd., is not paying a dividend for the year ended March 31st. For 1938-39 the payment totalled 15 per cent. (5 per cent. interim and 10 per cent. final).

Glasgow.—Additions to printing rooms, &c., for Yarrow & Co., Ltd.; C. J. McNair and Elder, architects, 272, St. Vincent Street, Glasgow.

Buildings for Campbells Downes & Co., Ltd.; manager.

Five cleansing stations for Corporation Police Department.

Boiler house for British Electrical Repairs, Ltd.; manager.

Extensions to property for Steel Company of Scotland; Colville Constructional Co., Ltd., Glengarnock.

Gravesend.—Temporary church, West Court estate; W. Hopkins.

Cooling room, Brewhouse Yard slaughterhouses; A. E. Terry.

Hampshire.—Remand home (£3,500); county architect, The Castle, Winchester.

Harrow.—Communal surface shelters (£70,889); surveyor, Council Offices, Uxbridge Road, Stanmore.

Lancaster.—Flats, Queen Street; H. T. Morris, Quernmore, Lancaster.

Extensions to boot factory, Bulk Road; Somervell Bros., Ltd.

Liverpool.—Shelters at Dovecot and Burlington children's dining centres; borough engineer, Municipal Offices, Dale Street.

Maidenhead.—Boiler house, The Islet, Maidenhead Court; Courtaulds, Ltd.

Manchester.—Additions to works for Crossley Bros., Ltd.; T. A. Fitton & Son, architects, 7, Chapel Walk, Cross Street.

Additions to boiler house and dye works; British Cotton & Wool Dyers' Association, 22, Cumberland Street, Deansgate, Manchester.

Extensions to Slack Works; Russell Building & Contracting Co., Ltd., 165, Plymouth Grove, Longsight, Manchester, 14.

Flats, Block "F," Gorton Lane, West Gorton, for Housing Committee; housing director, Town Hall.

Duplicate sludge pumping station; City Engineer's Office, Town Hall, Manchester, 2.

Milford Haven.—Houses (72), Hakin, Milford Haven, for U.D.C.; T. C. Williams, engineer and surveyor, Town Hall, Milford Haven.

Moray and Nairn.—Shelters throughout county (£5,000); county architect, County Buildings, Elgin.

Newcastle-on-Tyne. — Communal air-raid shelter; W. Dixon & Son, architect, 1, Collingwood Street, Newcastle.

Newport (Fifeshire).—Four public surface air-raid shelters for Town Council; borough surveyor, Municipal Buildings, Newport, Fife.

Northam.—Shelters, Northam, Appledore and Westward Ho! for U.D.C.; surveyor, Windmill Lane.

Northern Ireland (Co. Armagh).—Improvements and general reconstruction, Cabra School, near Tangeragee; G. A. Henry, The Mall, Armagh.

Ogmore and Garw.—Additions and alterations to laundry block at Isolation Hospital, for U.D.C.; A. H. Jenkins, engineer, Council Offices, Brynmenyn, near Bridgend, Glam.

Pembrokeshire.—Shelters and decontamination station (£6,000), Haverfordwest; county architect, County Offices, Haverfordwest.

Rotherham.—Air-raid shelters in Imperial Buildings, The Court House and old Town Hall basements, and All Saints' Square; V. Turner, borough engineer, Town Hall.

Buildings; J. J. Habershon & Sons, Ltd.

St. Albans. — Additional shelters (£3,350); borough engineer.

Settle.—Rebuilding paper mill for J. Roberts & Son (Lancliffe), Ltd.

Sheffield.—Air-raid shelter and highway depot, and extension of Rutland Street Depot; W. G. Davies, city architect, Town Hall, Sheffield.

Buildings, Stanley Street and Ellesmere Road; R. H. Knowles & Son, Ltd., builders, Herries Road, Sheffield.

Stores and air-raid shelters; Laycock Engineering Co., Ltd.

Southall.—Shops and flats, 63-4, Delamere Road; Hayes Bridge Estates, Ltd.

Flats, 23-5, Norwood Road; Marylebone Building Society.

Southport.—Alteration to pumping stations for the Southport and District Water Board; Jones & Rigby, architects, 272, Lord Street, Southport.

Temporary factory; A. Holland & Co., Ltd.

Spilsby. — Completion of works at Mumby borehole (£1,000), for R.D.C.; H. P. Hill, consulting engineer.

Stoke-on-Trent. — Rebuilding ovens, Alexander Potteries; Myott, Son & Co.

New premises, Marsh Street, Hanley; Y.M.C.A.

Reconstruction of abattoir, Bryan Street, Hanley; F. W. James & Sons.

Stretford.—Reconstruction of top floor of printing works; Norbury Printers, Ltd., Elsinore Road, Old Trafford.

Office extensions, Westinghouse Road; Redpath, Brown & Co., Ltd., engineers, Trafford Park.

Sunderland.—Alterations for the Wear Winch & Foundry Co.; G. T. Brown & Son, architects, 51, Fawcett Street, Sunderland.

Surrey.—Alterations to St. Helier Hospital, Morden (£7,554); county architect, Kingston-on-Thames.

Adapting premises for remand home, Maybury Hill, Woking (£1,000); county architect.

Swansea.—Works at reservoir, including the provision of plant (£2,700); borough engineer, Guildhall.

Truro.—Seven public shelters; borough engineer.

Tynemouth.—Development, Fontburn Quarry; Northumberland Whinstone Co., Ltd.

Wakefield.—Extensions to wire works; A. T. Verity & Son, Moor Dene, Birkenshaw, Bradford.

Wallsend. — A.R.P. work at St. Columba's and St. Aidan's R.C. Schools (£1,360); R. Burke, architect, Singleton House, Northumberland Road, Newcastle.

West Sussex.—Police station, Shoreham; county architect, County Hall, Chichester.

Whitby.—Reconstruction of the Imperial Hotel, Church Street; manager.

Wiltshire.—Alterations at Warminster Institution; T. Walker, county architect, County Offices, Trowbridge.

Woking.—Clinic extensions, Woking & District Victoria Hospital, and additions to open-air wards, St. Nicholas and St. Martin's Orthopædic Hospital; borough engineer.

Workington.—Further school shelters; borough engineer.

Worksop.—Additions and alterations to bakery, Creswell Street; J. Freestone & Sons, Ltd.

Offices and messrooms, Sandy Lane; General Refractories, Ltd.

Machine shop; Oates, Ltd.

Electrical Fatalities

Plumber's Fatal Shock

A VERDICT of "Death from heart failure due to electric shock accidentally caused by standing on a conduit with faulty wiring inside," was recorded at an inquest last week at Swansea on Arthur Glyn Bevan, aged thirty-nine, a plumber.

Mr. S. Manning, Bevan's assistant, said that he accompanied him to Gloucester House to put in a hot-water radiator in an upstairs office. They went into a small room under the roof, and Bevan walked across to a tank in the corner. He leaned on it to look inside and then started to shout. Witness tried to pull him away from the tank but was unable to do so. He pulled the fuses out.

Mr. A. J. Jarrett, of Swansea Corporation Electricity Department, said that a tube on which Bevan's toe was resting was running along a joist close to the tank. He found that the wiring was dead to earth on the pipe, and that the pipe was not earthed, so that the wiring was faulty.

Works Switchgear Explosion

An inquest was held at Newcastle on Harold Ernest Williams, aged fifty-three, electrical engineer, who was killed by an electrical explosion at a works on May 12th, when three other men were injured.

Mr. D. Wilbraham, an electrician, said that following the joining up of cables at the works he prepared to rack in the switch to which they had been connected. There was a loud explosion and he was temporarily blinded and burned on the neck, face and hands. When he recovered his eyesight he was about 20 yards from the scene of the explosion. He managed to open the door of the main transformer house and tripped out the switch. He found Williams was with him. They were taken to Newcastle Infirmary. The switch was in order.

In reply to Mr. F. Murgatroyd, factory inspector for electrical apparatus, he said he was not aware that the transformer switch had tripped automatically after the explosion and before he knocked it out. After the explosion the switch continued to "roar" for about five minutes, which showed that the current was still on. For the five minutes it was on it did a great deal of damage.

Mr. T. Watson, who was injured by the explosion, said he could not account for the short-circuit which caused the explosion, and Mr. R. C. Wade, an engineer employed by British Insulated Cables, Ltd., also stated that he did not know what had caused the explosion. The inquest was adjourned until August 28th.

Transformer Station Operator Killed

In recording a verdict in accordance with medical evidence a jury at a Swords, Eire, inquest last week added a rider that "the safety precautions where the deceased was working were totally inadequate." The inquiry was into the death of John O'Toole, aged forty-one, an operator at the Electricity Supply Board transformer station at Swords. Mr. James O'Toole stated that the alarm went at the station and deceased stopped it. He then got on a table to attend to an instrument on the wall and told witness to go outside to look at the tap. When he returned there were flames and John O'Toole was leaning over a rail protecting rods which carried a heavy current. He caught hold of his coat and pulled him down.

Australian News

Effects of Coal Strike

OUR Perth (W.A.) correspondent reports that for a short period the New South Wales coal strike affected the electrical industry of that State very severely, and had it lasted longer it was apparent that conditions would have been extremely grave. As it was, regulations were gazetted by the State Government prohibiting the use of gas or electricity for cooking purposes except between the hours of 5 a.m. and 8.30 a.m., and between 4.30p.m. and 7 p.m. Inspectors were authorised to enter premises to enforce the regulations.

The Minister for Works and Local Government (Mr. Martin) said that the Government had decided to delay action as long as possible regarding the use of electricity for industrial purposes in order that as much notice as possible could be given to employers that they would be deprived of power. This step was found unnecessary owing to the settlement of the strike. All night outdoor sporting events were suspended, and the use of electrical advertising signs was prohibited.

Sydney County Council authorities urged the lifting of the restrictions almost immediately they had been put into force, stating that they had made a purchase of 30,000 tons of "duff" which lay at Abermain. Employers were notified that, should it be found necessary to discharge employees owing to the conditions set up, the usual periods of notice as prescribed by the arbitration courts would not need to be given. However, the seriousness of conditions in Europe led to a rapid termination of the strike, and conditions are now once more normal.